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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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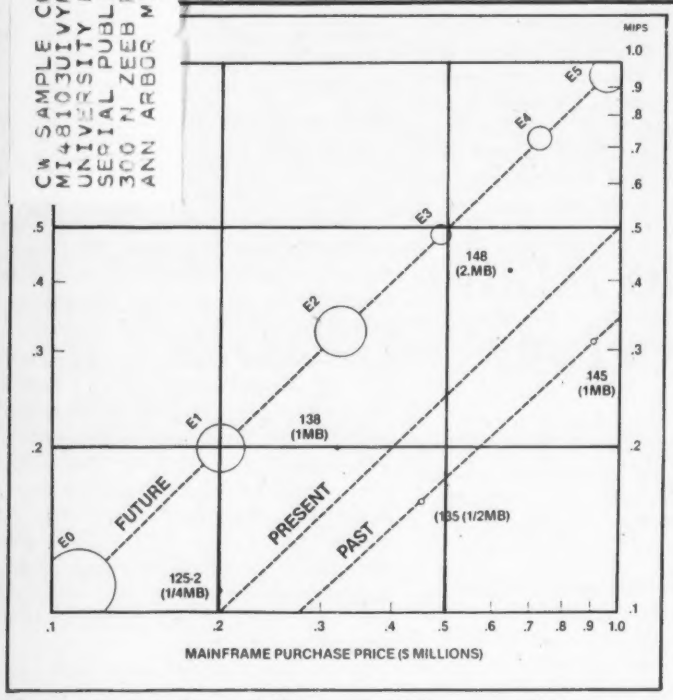

Shown above is the probable range of the expected E series of computers from IBM. The circled areas indicate where individual products will fall along the E series line, since the prices and performance of the individual machines may be fine-tuned by IBM as their announcement dates near. The chart was compiled by Advanced Computer Techniques Corp.'s Technology Analysis Group for a study entitled "IBM Systems in the '80s."

IBM Expected to Unwrap Double-Powered 'E Series'

By E. Drake Lundell Jr.
CW Staff

Users of IBM's small and medium-scale computers will be able to get at least twice the power of their present systems — and possibly much greater price/performance gains — when IBM announces its E series later this year or early in 1979.

The E series will also offer these users expanded memory capacity and new software/-firmware functions, according to industry watchers interviewed by *Computerworld*.

The series, which will range in processor power from about 100,000 instructions per second to 1 million instructions per second (Mips), could be based on a bus structure much like that used in the recently announced Magnuson Systems Corp. M80 Model 3 and Model 4 [CW, May 22].

Ultimately, the industry experts agree, there probably will be six machines in the series (see chart at left), but most feel IBM will initially announce only the first three processors, with the upper level machines announced six months to a year later.

IBM's present production schedule (see story on Page 4) tends to confirm this view; the mainframer is not producing any new machines at the lower end of the 370 line. The 370/138 and 370/148 are still being manufactured, however, and it is these machines which would compete with the top of the E series.

The six units in the E series — known at IBM as the E0, E1, E2, E3, E4 and E5 — will probably be based on just two new CPUs, with the E1 and E2 based on the E0 processor and the E4 and E5 based on the E3 processor, according to Robert Fertig, vice-president of Advanced Computer Techniques Corp.'s Technology Analysis Group (ACT/TAG).

Upgrading within the E series might be accomplished in the field, Fertig noted, by simply replacing boards in the machines — without any user disruption.

More Than Raw Processor Power

At the same time ACT/TAG predicted the E series machines' price/performance ratio may be significantly increased above that for raw processor power by operating system and firmware additions to the line, which may be introduced with first shipments of the series.

While the raw processor improvements will show approximately a 2:1 improvement over the Mips rates available with the present 370 equipment, the operating system and firmware enhancements could add 50% to 100% more performance to the E series, according to ACT/TAG.

The first units will supersede the 370/115 and 370/125 — "clearly the weakest link in the 370 line" — and will be announced as early as the fourth quarter of this year or as late as the first quarter of next year, Fertig predicted. The follow-ons, replacing the 370/138 and 370/148, will be announced about the third or fourth quarter of 1979, he believes.

The low-end systems will probably provide bridges for System/3 users, Fertig said — but, he added, the problem of "contention" between IBM's General Systems Division and Data Processing Division is stalling the E se-

(Continued on Page 5)

Federal Study Group Finds

Government Treating DPers Ineptly

By Don Leavitt
CW Staff

WASHINGTON, D.C. — The government is doing a poor job of hiring, classifying, training, working with and retaining DP personnel.

That's the message that comes through loud and clear from a draft report just issued by the personnel team of the Federal DP Reorganization Study group.

There are ways of reversing the situation, the report suggested, but not much time: "The personnel who perform DP functions are a vital resource and their problems directly influence the efficiency and effectiveness of the government's operation. It is therefore imperative that [the problems] be identified, recognized and solved without further delay."

The problems start because in many government installations, "DP and senior management's perspective of information technology's function and significance to the mission [of the agency] impacts negatively on the ability of DP personnel to effectively contribute to the goals and objectives of

(Continued on Page 8)

CCITT Committee Drafts Transborder Network Links

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. — Two protocol standards for connecting public data networks across national boundaries were among the achievements of the Consultative Committee on International Telephone and Telegraph's (CCITT) Study Group 7, which recently met in Geneva, Switzerland.

Work also progressed on a datagram standard and a newer concept called the Frame Mode Data Terminal Equipment (DTE) standard.

One of the completed standards is X.75, the gateway interface for public packet-switched, virtual-circuit data networks operating under the X.25 standard.

The X.75 standard establishes uniform procedures under which public data nets can be interfaced.

Technically, X.75 is now subject to the 90-day balloting procedure but, according to Harold Folts, chairman of the American National Standards Institute (Ansi) X3S37 task group on public data networks here, acceptance of the standard is virtually assured.

Implementation of X.75 will be trans-

(Continued on Page 8)

IN DEPTH
IN DEPTH
IN DEPTH

CW offers a double-header this week: Charles P. Lecht begins Chapter III of Tsunami *on Page 82 and Ronald G. Ross looks at current offerings in Part 3 of "Data Base Systems: Design, Implementation and Management," beginning on Page 105.*

Memorex Case Going to Jury

By E. Drake Lundell Jr.
CW Staff

SAN FRANCISCO — By this Wednesday evening, the issue of whether IBM monopolized the computer industry will be in the hands of 11 jurors who are hearing Memorex Corp.'s antitrust case against that firm.

Their decision will have wide-ranging consequences for computer users and the industry alike.

On Wednesday, Judge Samuel Conti will mount the bench of the Federal District Court here and read those jurors 87 separate charges and explanations of the law governing such cases. The 11 will then retire for what is expected to be quite a while to reach their decision in the $1 billion case.

Among the judge's charges is one that is apparently a victory for Memorex, even though it will not know whether that victory was meaningful or not until the jury comes in with its decision.

In charge No. 50, Conti will instruct the jury that IBM did not have to price products below "average variable cost" in order to be de-

(Continued on Page 4)

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End Long Contract Dispute

Schaefer, EDS Settle Out of Court

By Ann Dooley
CW Staff

NEW YORK — The F&M Schaefer Brewing Co. and Electronic Data Systems Corp. (EDS) ended their lengthy legal battle over a disputed facilities management and software development contract in an out-of-court agreement over the Memorial Day weekend, settling for significantly smaller amounts than had been asked.

EDS paid Schaefer $2.3 million in the settlement and EDS retained the $1.3 million sum Schaefer had paid the DP firm under a prior court order [CW, March 21, 1977]. Schaefer's payment was a final termination payment claimed by EDS under a former contract between the two parties.

The settlement was for much less than Schaefer's suit, which had asked for actual damages of $45 million and punitive damages of $70 million. The brewing company had claimed that EDS was negligent in supplying an "inadequate" system and also that it was not significantly different from Schaefer's original system [CW, Sept. 13, 1976].

In its countersuit, EDS asked for $19.3 million, charging that Schaefer conspired to defraud and deceive the facilities management firm [CW, Feb. 21, 1977].

Both parties settled to avoid the continuing cost of prolonged litigation, according to an EDS spokesman. Since Schaefer has now met all of its contractual obligations, it will keep and continue to use the disputed system, the spokesman added. Schaefer had no comment except to say that the suit had ended.

Although the suit never came to trial, several pretrial hearings were held in the Federal District Court of New York with Judge Constance Baker Motley presiding.

At one point, Motley ruled that software was a "tangible" commodity and that Schaefer must return the system and its software to EDS or pay the $1.3 million remains of the contract pending the outcome of the trial [CW, March 21, 1977].

In the course of other pretrial hearings, Motley also declared that computer specialists and their clients have a "special relationship" which makes them liable to malpractice claims even years after the contract has ended [CW, Nov. 28].

EDS announced its net income for the quarter ending June 30 will be reduced by $750,000 as a result of the settlement.

ACM Asks USSR to Allow Sharansky Trial Observer

NEW YORK — The Association for Computing Machinery (ACM) has asked Soviet President Leonid I. Brezhnev that an ACM observer be allowed to attend computer scientist Anatole Sharansky's upcoming trial.

Sharansky is accused of working as a spy for the U.S. Central Intelligence Agency (CIA). Although his trial on those charges is expected to take place soon, no date has yet been set.

Although ACM president Herbert R.J. Grosch sent the telegram to Brezhnev in early April, there has been no response and none is expected, according to ACM officials.

In his telegram, Grosch said he made his request because of guidelines in the ACM constitution which include promoting "freedom in interchanging information about computer technology."

Grosch made no comment on Sharansky's guilt or innocence in his appeal to Brezhnev, but expressed strong support for fair and open conduct of the trial.

There are several qualified computer scientists within ACM who could serve as observers, according to Grosch, who also noted that ACM could cooperate with other scientific societies, such as the National Academy of Sciences, that have made similar requests to send observers.

ACM has previously sent messages concerning Sharansky to Ambassador Anatoly F. Dobrynin in Washington and President of the Soviet Academy of Sciences A.P. Aleksandrov [CW, Dec. 12].

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12	Standard Oil (Ind.)
13	Atlantic Richfield
14	Shell Oil
15	U.S. Steel
16	E. I. du Pont de Nemours
17	Continental Oil
18	Western Electric
19	Tenneco
20	Procter & Gamble
21	Union Carbide
22	Goodyear Tire & Rubber
23	Sun
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28	International Harvester
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36	Beatrice Foods
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39	Xerox
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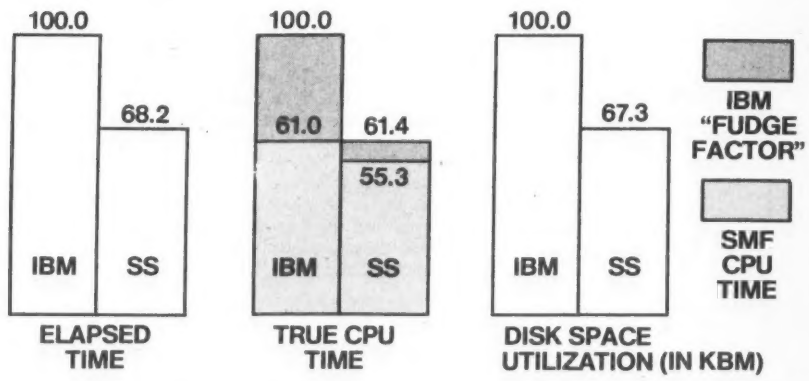

If that's the case, why doesn't everyone sort with SyncSort? Frankly, we don't know. That's the biggest puzzle of all.

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Three Minis in the Works At IBM, Observers Certain

By E. Drake Lundell Jr.
CW Staff

In addition to its small- to medium-scale E series, IBM is currently working on three new minicomputers as well as improvements for its Series/1 minicomputer, according to industry observers.

The new minis will be announced later this year or early next year, industry analysts believe, and will put IBM firmly into the minicomputer marketplace.

The minis will also place IBM's Data Processing Division (DPD) in direct competition with its General Systems Division (GSD), which until now has had sole IBM responsibility for penetrating this market.

The new minis will offer up to three or four times the performance of comparable present products, the industry observers indicated. They include the Aztec system under development in the Systems Products Division and expected to be marketed by DPD; the Orbit system being developed by the System Communications Division, also targeted for DPD marketing; and the Pacific system, which will be developed and sold by GSD.

The Aztec system will be "IBM's main distributed data processing thrust into the 1980s," according to Robert Fertig, vice-president of the Technology Analysis Group at Advanced Computer Techniques Corp. Aztec will offer users greater processing power than that currently available with the 3790 systems and will also have greater memory and greater disk capacity, the industry observer said.

The Orbit system will be a minicomputer-based intelligent terminal or remote job entry system, observers said, and should be ready for announcement this year.

GSD's Pacific system will be a more traditional follow-on product for the firm and will be used to migrate some System/3 users as well as users of the System/32 and System/34.

This system will follow the System/32 and System/34 architecture and will have bridges to the System/3 base, the industry observers indicated. It may be announced as a System/35 or 36 and should be out later this year or next year.

At the same time, GSD is not putting all its eggs into the Pacific basket. It is working on improvements to the Series/1 that should also be ready within 12 months, making that system more powerful and better suited to commercial applications, the observers predicted.

The Basis for Speculation

WHITE PLAINS, N.Y. — Of the 14 central processors in IBM's 370 line, only five are "in new production" and these are concentrated at the medium- to large-scale end of the line.

IBM uses three categories to indicate the production status of its machines. Systems it is producing from scratch are called "in new production"; those for which the firm is making only some parts are said to be "in limited new production"; and systems on which all production work has stopped are "not in new production."

At present, the only processors in the 370 line classified as "in new production" are the 370/138, 370/148, 3031, 3032 and 3033. The rest of the 370 line is classified as "not in new production," the lowest status IBM assigns to equipment.

This is one fact industry observers use in trying to predict the announcement of new machines.

The firm is not currently producing any machines below the level of the 370/138 and 370/148, leading industry sources to speculate IBM will announce the lower end of the E series to fill this gap (at the 370/115 and 370/125 level) first. Those upper end machines would compete with the 370/138 and 370/148 IBM is still producing.

Memorex Case Going to Jury This Week

(Continued from Page 1)

termined a monopolist — a contention that is often made by IBM.

The wording used by the judge — which he worked out in conferences with the lawyers for each side — is sure to be appealed by IBM if it should lose.

Monopolization could be shown, Conti will tell the jurors, "by evidence that IBM charged a price which, although above marginal or average variable costs, was below its short run profit-maximizing price and that barriers to entry were great enough to prevent other entry before IBM could reap the benefits of its market position."

Issue Arose Earlier

This problem has come up before in antitrust cases involving IBM.

Judge A. Sherman Christensen held in the Telex vs. IBM case that IBM had monopolized the market even though he did not find that IBM had priced its products below their costs.

However, on appeal, IBM forcefully argued that it could not be found to be a monopolist unless it priced below cost, convincing the 10th Circuit Court of Appeals that its position was right.

In spite of this, Conti, in meetings with the lawyers here, insisted on leaving that instruction in the charge to the jurors, noting that later cases have upheld that position.

"I'm going to say it," the judge told the lawyers in a recent meeting, and "having said it, I will let somebody else tell me whether I am right or wrong.

"But I think this. I think as a matter of philosophy, you don't have to have below-average marginal cost. I mean, if a company sacrifice[s] its profits now in order to exclude competition or, to control prices, takes lower costs and then later on when the competition is out, raises the prices, it doesn't make any difference whether [the prices are] below [the firm's] costs or not . . . as long as they accomplish the end of being able to control the prices.

"You can control prices by having them above your costs," he added over objections of IBM lawyers.

Questions to Jurors

In all, the 11 jurors will have to answer — unanimously — several questions that will be put to them on the "verdict form" they will be given on Wednesday.

The first question will be on the general-purpose computer market: "Does a relevant general-purpose computer systems market or submarket exist?"

If they answer "yes," then they are asked "Did IBM monopolize this market or submarket?" and "Did IBM attempt to monopolize this market or submarket?"

If the answers are "yes" to either of those questions, then the jury must determine what, if any damages Memorex suffered as a result of IBM's antitrust violation or violations in this market or submarket and put in a dollar figure for those damages.

If the answer is "no" to any of those questions, then the jury finds IBM not guilty of that charge and goes on to the next questions, which are identical but cover the plug-compatible disk market, the communications control unit market and the disk pack market.

The Memorex case is the most ambitious of the antitrust cases brought against IBM by plug-compatible manufacturers in that it asks for a ruling on the general-purpose systems market — which Memorex tried to enter — as well as the separate peripheral submarkets.

High Stakes

And the stakes are high. Memorex claims damages of more than $300 million, alleging that its business suffered that much by IBM actions in the various markets.

Since antitrust damages are tripled in private cases, the amount of the award could run to almost $1 billion if the jury accepts all of the Memorex contentions.

In addition, if a decision adverse to IBM is reached by the jury and upheld by higher courts, the case could set a precedent that would encourage other competitors and users to sue IBM on antitrust grounds.

That is one reason IBM is sure to challenge the judge's charge to the jury. Jury cases are rarely overturned on appeal, unless the appellate courts find clear error on the part of the judge in the case, and if it loses on this round, IBM is sure to zero in on any possible errors on the judge's part when it appeals.

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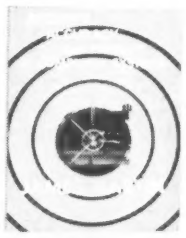

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Year-End Announcement of 'E Series' Possible

(Continued from Page 1)

ries announcement. The use of bridges is one of the reasons for such contention, he said.

On memory for the systems, ACT/TAG predicted that at least a fourfold increase in main memory capacity over the present systems is likely and that this memory capacity upgrade will be announced with the initial E series introductions.

When all the microcode improvements are available with the systems, users can expect 2.5 to three times the performance of their present machines for approximately the same price, Fertig said.

Indicating that "even IBM doesn't know the exact price of the E series" machines yet, Fertig said users should be able to get a machine offering 100,000 instructions per second for about $100,000 and a 1 Mips machine for approximately $1 million. However, he noted that IBM can fine-tune the price/performance of the machines as their announcement date nears.

On the software side, ACT/TAG indicated the E series will have more functions built into firmware, offering greater performance and increased reliability.

"IBM has to offer more functions per dollar," Fertig said, since competitors could "quickly respond to announcements that just offered more processor power per dollar or a lower price."

Therefore, functions such as increased "reliability, availability and serviceability (RAS)" might be part of the package in addition to the increased performance, ACT/TAG predicted.

In addition, IBM may buy 16K chips from outside vendors for use in the E series, Fertig said, packaging them into 32K memory modules. The firm is presently investigating two sources of supply for such chips, he noted.

By buying 16K chips outside, IBM would be free to gear up for internal production of 64K chips for use on later machines, expected in the early 1980s, he added.

Greater Interactivity

Another observer, Drexel Burnham and Lambert, Inc. Vice-President Harry Edelson, expects the E series to be announced by the end of this year with an operating system different from that of the 370 line, although it could run 370 programs. The operating system will allow more interactive applications, he predicted.

At the same time, Edelson said he expects the firm to announce a separate machine — perhaps a System/4 — to serve as the bridge system between the System/3 base and the E machines.

Further, he mentioned the possibility of a 3M-byte System/3 under development in IBM's General Systems Division.

A bit more bullish on the power of the systems is Gideon Gartner, vice-president for technology in the research department at Oppenheimer and Co., Inc. Gartner thinks that the E series systems will offer at least a 3.5:1 performance improvement over the current offerings in the 370 line and that IBM will offer a system at the top end of the E series with better performance than the 370/148 for less money.

At the same time, he feels the E series will be particularly price- and performance-competitive at the lower end of the line, where the "megamini people" are eating into the IBM preserve.

Separately Priced Software

At International Data Corp., Vice-President James Peacock also expects the E series later this year — perhaps as early as the third quarter. He predicted the systems will offer a 2:1 price/-performance improvement at the upper end and a bit better ratio at the lower end.

The E series, he said, will have a larger reloadable control store than present IBM products and will be much more tailorable in the field for individual applications and uses.

At the same time, IBM will put more of its software into firmware, Peacock forecast, and will separately price more of its software and operating systems.

By the 1980s, Peacock said, most of the components of the operating systems from IBM will carry price tags because this is the firm's "only defense" against the plug-compatible CPU makers.

William Easterbrook, a research vice-president specializing in computers for Kidder, Peabody and Co., also expects to see more modularity in pricing of software from IBM.

"IBM needs nonprice reactions" in order to slow the impact of the plug-compatible manufacturers, he said.

McCracken Gets Top ACM Post

NEW YORK — Daniel D. McCracken, current vice-president of the Association for Computing Machinery (ACM), was elected ACM president for a two-year term beginning July 1.

McCracken is an internationally known consultant, lecturer and author of 15 books on computers and programming language.

Peter J. Denning, professor of computer science at Purdue University, was elected-vice president and David H. Brandin, executive director of the Computer Science and Technology Division at Stanford Research Institute, was elected secretary.

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Mid-Range IBM Users Offered More for Less

SYSTEM / CHARACTERISTICS	IBM 370/138	MAGNUSON M80 Model 3	NATIONAL SEMI System 400	NCSS 3200	IBM 370/148	MAGNUSON M80 Model 4	IBM 3031
Relative CPU Power[1]	10	15	15	18[4]	20	32	52
Memory Size in Bytes (Minimum to Maximum)	512K to 1M	512K to 16M	256K to 16M	256K to 4M[5]	1M to 2M	1M to 16M	2M to 6M
Purchase Price[2]	$333,600	$245,000	$200,000[3]	$230,500[6]	$548,450	$395,000	$830,000[7]
Monthly Lease[2] (Lease Term)	$10,460 (4 Years)	$9,500 (Monthly)	$5,266 (4 Years)	$5,363[6] (5 Years)	$17,280 (4 Years)	$18,500 (Monthly)	$21,320[7] (4 Years)
Memory Cycle Time (Nsec)	715 - 935	300	400	650	405-540	300	345
Machine Cycle Time (Nsec)	275 - 1,485	100	100	250	180-270	100	115
Channels (Minimum to Maximum)	3 Standard	3 to 16	0 to 12	1 to 8	5 Standard	5 to 16	6 Standard
Cache (Buffer) Size	None	None	None	None	None	None	32K
Bus Architecture?	No	Yes	Yes	Yes	No	Yes	No
Price per 1M Byte Of Main Memory	$110,000	$80,000	$70,000	$60,000[6]	$110,000	$80,000	$110,000

By E. Drake Lundell Jr.
CW Staff

Users of IBM mid-range computers have been deluged since mid-April with offerings from a growing list of suppliers making CPUs compatible with the 370/138 and 370/148.

The upshot of the activity is that users now can get compatible machines that offer 50% to 80% more performance than their IBM gear — at a savings of up to one-third the price of the IBM systems.

National CSS, Inc. (NCSS) started the ball rolling when it announced it would market a system made by Two Pi Co. with NCSS' VPS operating system, which is compatible with the IBM 360 and 370 series [CW, April 17].

Then, in the first week of May, National Semiconductor Corp. jumped at least part way into the business with the announcement of its System 400 processor, a replacement for the IBM 370/138 and 370/145 [CW, May 8].

Most recently, the furious activity in this area was capped with the introduction of two systems — the M80 Model 3 and M80 Model 4 — from Magnuson Systems Corp. to emulate the 370/138 and 370/148 [CW, May 22].

In order to put some of these systems in perspective, *Computerworld* compiled the accompanying chart to compare these systems with their competitors in the IBM 370 line.

All of the independent systems offer users clear price breaks over their competitive IBM units, with user savings amounting to more than $150,000 — or about 30% of the purchase price in some cases.

Performance Evaluated

In addition, almost all of the units provide performance increases over their IBM counterparts, with the Magnuson and National Semi machines offering increased memory and machine cycle times.

The Two Pi system, however, comes in just under the level of the IBM machines in both of these categories, but the more efficient NCSS operating system is said to provide users with a machine capable of almost twice the throughput of the IBM 370/138.

When compared with the IBM 370/138, for example, the competitors from Magnuson and National Semi boast about 50% more performance than the IBM unit, while the CSS machine with the CSS operating system is estimated to provide around 1.8 times the IBM performance. The performance of the others is based on running IBM operating systems.

The Magnuson machine will cost users almost $89,000 less on a purchase price, while the National Semi system undercuts the IBM price by about $133,000. The NCSS 3200 with software will cost the user $103,000 less than the comparable 370/138.

The major competition at the Model 148 Level is the Magnuson M80 Model 4, although some of the other plug-compatible machines can be configured to provide IBM with competition in this area. The Magnuson Model 4 gives users a 50% performance increase while letting them save $153,000 on a purchase basis — a savings of about 30% over the IBM offering in this area.

All of the independent systems offer IBM users another important plus — the possibility of more main memory than IBM offers. All of the systems from Magnuson, National Semi or Two Pi can be configured with up to 16M bytes of memory, while the IBM 370/138 can only go up to 1M byte, the 370/148 only to 2M bytes and the 3031 only to the 6M-byte level.

Users who have run out of memory space but who do not need more computer power may turn in some of their larger IBM systems for these plug-compatibles configured at their maximum memory size, according to industry observers.

NOTES

1. International Data Corp. estimates for the IBM machines based on IBM 3033 = 200. CW estimates for compatible manufacturers based on company claims.
2. Prices are for CPU, 1Mbyte of main memory, console and power supply and were supplied by the manufacturers.
3. Price for a System 400 including two I/O processors (equivalent to two channels), a 200M-byte disk, magnetic tape unit and printer in a single quantity.
4. Relative power of the Two Pi machine configured into a 3200 system with the VPS operating system from CSS.
5. Can be extended to 16M bytes in OEM configurations with the addition of circuitry. As marketed to end users by NCSS, the present memory maximum is 2M bytes.
6. End-user price including the VPS operating system, a 5% software license credit, installation service and three channels as quoted by NCSS.
7. Price for a 2M-byte configuration, which is the smallest available from IBM; 1M byte of memory from IBM sells for $110,000 and rents for $3,460/mo on a four-year lease.

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TRW to Service Docutel Tellers

DALLAS — Docutel Corp. has signed a letter of intent with TRW, Inc. for field maintenance service on Docutel products.

Under the agreement, which is expected to become effective by mid-July, TRW will assume responsibility for maintaining more than 3,700 automated teller products.

Docutel will continue engineering support of its installed products and plans to add products to the arrangement, according to a spokesman for the company.

Seeks Position From Carter

Senate Urges Policy on International Data

By G. Russell Pipe
Special to CW

WASHINGTON, D.C. — The Carter Administration is being prodded by Congress to develop a comprehensive U.S. policy on international communications including the problem of transborder data flow.

In a new section added to the appropriations bill for the State Department and the International Communications Agency, the Senate Foreign Relations Committee called on the President last week to report to Congress on "the procedures he has established by which to develop and maintain a comprehensive U.S. policy regarding international communications and information issues."

If the Foreign Relations Committee addition to S-3076 is adopted by the full Congress, the President would have to submit that report by January 20.

The President would also have to define the U.S. goals and positions that will be taken at several upcoming international meetings on the subjects.

It is "imperative," the committee said," for the U.S. government to formulate a comprehensive policy regarding various communications and information issues."

Agreement From White House

The White House has apparently agreed to the proposal, Senate sources said. If the amendment is passed, the subject may be taken up in a special Presidential memorandum, they said.

Sen. George McGovern (D-S.D.) focused on the need for a coherent international communication-information policy during hearings held last June, and more recently, a staff report prepared by Senate aides George Kroloff and Scott Cohen indicated the U.S. is unprepared for debates and decisions to be taken at several important conferences.

These meetings, taking place in the next 14 months, include the general conference of the United Nations Educational, Scientific and Cultural Organization (Unesco), the fall meeting of the UN General Assembly, the UN Conference on Science and Technology and the World Administrative Radio Conference (Warc).

"Although the U.S. is the leading user of communications channels and information in the world, the U.S. government has neither formulated a comprehensive policy regarding the various communications and information issues that have entered international discussion, nor even established an effective mechanism by which to develop and coordinate U.S. policy on these issues," the proposal stated.

McGovern, Percy Cosponsors

An accompanying explanatory report noted that the proposal was sponsored by Senators McGovern and Charles Percy (R-Ill.) in order to accelerate preparation of "a necessary policy-making mechanism, the goals and general policy (not negotiation) positions of the U.S. with regard to several crucial international meetings."

If the President is called upon to assemble the machinery and policy framework asked for by Congress, a cadre of officials and private individuals is likely to be utilized.

The National Security Council and the Department of State are working on transborder data flow problems, and strictly privacy issues are being considered by a Cabinet-level committee due to report soon.

The recently established National Telecommunications and Information Administration (NTIA), under Assistant Secretary of Commerce Henry Geller, along with several existing agencies such as the Federal Communications Commission, the National Bureau of Standards and the General Services Administration, have a hand in the mix of computer and telecommunications issues, most of which have international dimensions.

Group Studying Shared Facility For DP Backup

NEW YORK — Coopers and Lybrand has been selected to do a feasibility study on establishing a shared contingency computer center for use by 16 area companies with large DP installations.

The study will cost approximately $250,000 and take about six months to complete, according to Lee W. Spitler, executive vice-president of Irving Trust Co. — a member of the New York Contingency Facility (NYCF) — and chairman of the NYCF steering committee.

"Individual backup facilities are simply too costly for even the wealthiest corporations, and that leaves only the shared-facility concept," according to Robert Jacobson, staff director for the project group. "The purpose of this study is to find out if a variety of complex problems can be solved and if such a facility can prove to have alternative uses for the participants when not in an emergency mode," Jacobson added. [See related story, CW, Feb. 13.]

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Report Slams Government Treatment of DPers

(Continued from Page 1)

the agency," the report noted as it examined, first of all, the organizational role of DP.

There is no consensus within the federal government on where DP should be placed organizationally or what role it should play in the management scheme of things, the team said.

"In those instances where it is considered to be a significant element, DP management is looked upon and treated as an important facet of the management team," the report said, adding, "In large part [however], this is attributed to the capability of the incumbent, his/her demonstrated management talent and responsiveness to [upper] management."

To bring DP and other elements of the agencies closer, the team suggested several options. The first is to require information systems training for high-ranked functional managers, with an emphasis on how technology can be used rather than the mechanics of DP.

As either an alternative or an addition to that requirement, the report said the government might require that an impact analysis be performed on DP operations before major policy or procedural changes are implemented. The analysis should identify the effects, if any, on the personnel needs, skill changes and hardware/software considerations, the team added.

A third option, the report suggested, is that agencies establish in-house mechanisms for setting DP priorities and making policy decisions when conflicting demands for DP resources cannot be resolved at the operating level.

Finally, it might be well to assign responsibility for information systems policy and overall operations at the deputy assistant secretary level or higher, the report said.

Treatment of DPers

Then the team focused in more detail on how DPers are treated and what that treatment means to them:

"Problem: The nature of DP work and the jobs being performed are not adequately reflected in the standards by which positions are classified, resulting in ineffective position management . . .

"Problem: The examining and hiring process and noncompetitive salaries for [both] entry-level programmers and highly technical jobs adversely affect the federal government's ability to recruit and retain qualified DP personnel . . .

"Problem: Neither training nor career development programs are organized and administered to achieve the most effective development of personnel or utilization of DP technology."

After substantial discussion of each of these problems — including background material and one or more possible solutions for each — the report took note of several "other issues" which it said were not unique to DP but were nonetheless of major concern to many.

The report said, for example, that personnel ceilings are restrictive, inhibit flexibility and establish artificial barriers to adequate staffing. These ceilings force agencies to seek contractual assistance without regard to cost/-benefit considerations, thereby reducing the level of in-house expertise, the team contended.

Several pages later, the same point reappeared in slightly different words. "Excessive use of contractual DP support services is required by federal procurement policy and personnel ceiling limitations. It is more costly, degrades in-house capabilities, skill levels and morale," according to the team, and it "creates problems in assuring the quality of DP products."

Still deeper in its report, the team said that existing formal incentive systems are not properly set up or utilized for rewarding or motivating employees.

CCITT Committee Drafts Two Internetwork Protocols

(Continued from Page 1)

parent to network users and will be the responsibility of the carriers. X.75 is needed because public data nets may be compatible from a service standpoint, but they are implemented in different ways internally, according to Dr. Barry Wessler, vice-president of systems management and control at Telenet Communications Corp.

The internetwork protocol looks just like X.25, but with some minor additions. In X.25 there are some differences between the functions performed by the terminal and the functions performed by the network. These types of differences are eliminated under the X.75 protocol, Wessler said.

An example is in the area of "clearing causes," which define the reasons a device is cleared from the network. The net can send a number of clearing causes into a host CPU on the net, under X.25, but the host has only one such signal under X.75, Wessler explained.

On the other hand, the packet formats and the basic procedures are exactly the same in most areas where X.25 and X.75 are compared, he said. The Link Access Procedure B (LAP B) is basically the same under both protocols, he noted.

Meaning to User

The significance of X.75 to the user of a public data network is that it sets up the mechanism by which a message can be sent from one network to another network. A message from Telenet or Tymnet in the U.S. to Transpac in France, for example, would be sent to one of three U.S. International Record Carriers (IRC), which would handle the transatlantic portion of the route.

The IRC would hand the message to the overseas administration of the French postal, telephone and telegraph (PTT) authority, which in turn would interface with the domestic French Transpac net. Transpac would send the message to the called host or terminal on that network.

In practice, some of the required services for completing this particular sequence are not yet in place. Transpac is scheduled to begin operations this year and the IRCs do not yet offer packet services, although RCA Globecom will inaugurate this type of offering within the next month.

Numbering Scheme

Another accomplishment of the CCITT meeting was completion of X.121, a worldwide numbering scheme to be used for public data nets. The numbering scheme includes four digits, with three of those digits making up the country code.

The formal name for the number is the Data Net Identification Code (DNIC). Directories of the assigned numbers will be published and the scheme will begin soon.

At present, Tymnet and Telenet customers can access Datapac through a provisional interfacing scheme. Both X.75 and X.121 will be implemented for these services as soon as the carriers can complete the necessary arrangements, Ansi's Folts said.

The numbering plan was a key element for international interconnection of public data networks. As such, it is remarkable that a worldwide scheme was finalized with relatively few differences, according to one source who attended the meeting.

Datagram Protocol

A more forward-looking project considered at the Geneva meeting was the development of a datagram protocol. The U.S. delegation presented a proposal supporting a datagram standard and the French came in with a counterproposal, Folts said.

There was general acceptance at the meeting that a datagram protocol "will be pursued" with the objective of having a recommendation by the end of the study period — the spring of 1980, Folts explained.

Support of datagram is growing, Folts said, noting Germany and The Netherlands now back the project. More and more people are realizing that the virtual call of X.25 does not satisfy all of the requirements of operating on a public data network.

Frame Mode DTE

Frame Mode DTE is a subject actively under debate, according to Folts. In the long term it will provide a universal interface that will work for all services under all modes of operation. In concept, such an interface would work with packet-switched, circuit-switched, datagram, virtual call and any other types of services.

The goal is to come up with one universal interface which probably would have minor subsets. Such an interface would supersede the divergent interface standards now required, Folts explained. This project, not yet fully understood by standards-making participants, is not expected to be finished until the 1980s, he said.

The next full meeting of CCITT Study Group 7 will be held in the spring of 1980, at the end of the current study period. This meeting will be in preparation for the CCITT plenary meeting.

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Police Indicted for Using Net to Plan Thefts

By Catherine Arnst
CW Staff

NEW YORK — Two police officers here were recently indicted for "official misconduct" in separate incidents after each allegedly obtained information from a police department computer system for the purpose of obtaining stolen goods.

Ronald Ragone and James Ziede both were charged with using the Field and Administrative Terminal Network (FATN) with the intent to obtain a benefit for either themselves or another, "which constituted an unauthorized exercise of [their] official functions," according to the indictments.

Ragone, about whom more information is available supposedly used the system to obtain the address of the owner of an automobile that had some expensive radial tires he wanted.

The officer then allegedly gave the information to a thief so he could steal the tires and sell them back to Ragone. Ragone planned to pay $15 each for the five tires, which were valued at $90 each, according to an article in the *New York Post*.

New York police officials refused to comment on the details of either case, saying they were the subject of a "secret" investigation.

The network has been in operation since July 1976, but these incidents were the first abuses of their kind involving the system, a police department spokesman said.

FATN is tied into the New York State Department of Motor Vehicles system and the National Crime Information Center. The teleprocessing system is controlled by three Data General Corp. Nova 840 minicomputers, and there are 210 Olivetti Corp. CRT and

(Continued on Page 11)

USC Students Charged in Gear Rip-Off

By Brad Schultz
CW Staff

LOS ANGELES — The Los Angeles Police Department (LAPD) has arrested two University of Southern California (USC) students who allegedly tried to sell computer hardware stolen from the university.

The stolen equipment is worth from $16,000 to $23,000, although the students were apprehended trying to sell the goods for only $3,000, police sources said.

In a car belonging to one of the students, the LAPD also discovered a computer printout that documented an earlier attempt to surreptitiously alter their grade records and financial aid status by accessing the USC registrar's computer system, according to a university spokesman.

The students have confessed to the latter scheme, telling USC authorities that the attempt, made last February, failed largely because the students did not know enough of the necessary system passwords, Burt Wuttken of the USC news bureau said.

The students have been accused of stealing a Microdata Corp. A200 printer worth $11,000 as well as a Microdata "system" worth at least $5,000 that includes a disk drive, four circuit boards and terminals, according to the arresting officer, LAPD detective Bill Buck. Neither LAPD nor USC sources were able to identify model numbers for this system, but Buck said its street value could reach $12,000.

The students allegedly broke into a USC building, stole the devices and later offered to sell them to an individual described as a part-time USC instructor and computer hardware dealer.

The students did not tell this individual that the equipment was stolen, but he became suspicious anyway and alerted the LAPD to the situation, Buck said.

Buck and another officer posing as the dealer's associates arrested the students when they brought the equipment at the dealer's invitation, another police source stated.

As for last February's attempted grade alteration scheme, the students tried to access the grade transcript files stored on the registrar's system to award themselves good grades and credit for courses not taken, Wuttken said.

The students also tried to access the registrar's financial aid files in order to change their need status, which is based on personal or parent's income. If successful, they could have received unwarranted financial assistance, he indicated.

USC declined to describe how these files are protected, explaining that such disclosure would itself impair this security.

After the students face court action on the alleged larceny, USC authorities will convene a special hearing to decide their academic fate, Wuttken noted, explaining that suspension or expulsion from the university will be among the possible outcomes.

The students face no legal sanctions for their activity on the registrar's system, but the forthcoming hearing will consider the matter along with the alleged theft, Wuttken indicated.

LAPD and USC sources declined to identify the students or instructor involved.

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States' Action on Privacy 'Miniscule': Nasis

By Nancy French
CW Staff

LEXINGTON, Ky. — Despite the fact that legislatures of 15 states have seen fit to pass privacy laws that affect the recordkeeping of state DP agencies, little of that mandate has been translated into positive action to protect either data or access to DP centers, according to the National Association for State Information Systems (Nasis).

This finding appeared in Nasis' eighth annual report for the 1977 calendar year published here recently. The report is based on a survey of the DP departments of all 50 states and the Canadian province of Quebec.

Nineteen states have issued and implemented data security plans, 15 enforce them and 16 audit them, while 22 states reported no such plans at all, according to the report.

In the area of physical security, 32 states reported having issued and implemented such plans, while 30 enforce them and only 18 audit them, the report said. Twenty-eight rely for security on identification badges for entry into the DP center and 19 use guards instead.

Nasis called the progress made in this area over the past year "miniscule" with "the brightest note" being the 33% increase in the number of states auditing their total data security plans.

Nasis attributed this lack of attention to privacy and security of data to financial difficulties which have become increasingly bothersome since 1976.

The survey covered many other aspects of state DP activities including personnel, consulting expenditures and trends in computer inventories.

It also asked states to focus on internal and external problems. Here, 40 states reported missed programming schedules as the number one internal difficulty. This problem is being "exacerbated," they said, by the difficulty of recruiting qualified personnel on the one hand and tight budgets on the other. In fact, since 1974, high costs moved from fifth to fourth and then to second place in the problem ranks, where it has remained since 1976, the report indicated.

Cost overruns ranked third on the difficulty scale and that problem too, was voted more serious in 1977 than 1976 — this time by 21 compared with 11 states.

External Difficulties

But DP departments are also faced with external problems over which they have no control, the report said. Here, 43 states ranked management's lack of understanding as the number one external problem.

"Management understanding has been the number one problem since this data has been collected" in 1970, the report said, adding that the states reporting this situation have reversed last year's opinion that it is less serious than in previous times and now report it to be more serious by 4:3."

Lack of management interest and lack of a definitive DP plan continue to be among the most significant problems in this category; however, their seriousness has declined somewhat from prior reports, Nasis said. Lack of management interest in DP has also declined as a problem, falling from fourth to sixth place, while resistance to consolidation remains almost static over the years covered.

Recruitment of qualified personnel is shown to be a more serious problem by more than a 4-to-1 margin since 1971, moving from last (12th) to fifth place in ranking.

Long-range formalized state plans for DP and written standards and documentation for the various subactivities of the overall DP function have been goals of Nasis since it began its annual reports, Nasis said. "While the lack of definitive plans rates high in the order of external problems already discussed, the fact that each year more states report the development of long-range plans indicates this problem is being addressed, the report said. This year, 36 out of 50 states reported having plans compared with 16 out of 41 reporting in 1970.

However, the drafters of the report question why so many states rank this item as one of their most serious difficulties when so many show they have a plan.

It suggested some additional questions that might clarify this anomaly in future surveys. Among them was whether the plan once developed has been accepted and or endorsed by the governor and the legislature. A second question might be whether the user agencies played a part in developing the plan and whether they accept and assist in implementing it. Finally, the report said, the states might be asked how the plan is updated and kept current.

This year, 12 states reported having updated the plan during the current year. This is encouraging in Nasis' view, since "it suggests that the plan "is not merely a piece of paper to be placed on a shelf, but rather a document actively used in the decision-making process and is consciously kept current to make use of the latest state-of-the-art technology and to keep up with ever-changing state government programs."

In the area of equipment the report noted that absolute comparisons cannot be made among all years because of the changes in the states that report. However, the absolute growth between the years of 1976 and 1977 was 15 systems. The increase was made up of 16 large systems and 12 minicomputers, and the reduction was based on elimination of nine medium-scale and four small systems. This led Nasis to conclude that a number of medium-size installations have upgraded to larger equipment and that the majority of growth has been in the mini sector.

Further, the report pointed out, states are continuing to move away from leasing as a method of equipment acquisition, replacing it with a mix of a purchased CPU and leased peripheral equipment.

States also reported a continued increase in the use of software packages for information systems management needs such as project management, systems balancing and computer performance evaluation. Nasis found this indicative of "the ever-increasing quality of information systems management in state government."

Of the 44 states reporting on package use this year, 38 indicated use of some type of data base management system, and 16 of these said that by using a data base system they had been able to integrate series of records. An additional 30 states are planning to implement some type of integration, the survey indicated.

Answers to questions about transfer projects evince the mutual support and assistance Nasis members give one another in reducing the cost of implementing new applications, the report said. Many such transfer projects that in previous years were reported to be "in process" were reported "done" in 1977. Both system design and programming are included for applications ranging from exam validation and bridge structure to legislative bill status-reporting systems and medical and financial accounting systems.

The Nasis report includes a several-hundred-page appendix containing an application inventory along with descriptions as well as a listing of computer hardware and peripheral equipment.

The report can be obtained for $17.50 from Nasis at P.O. Box 11910, Lexington, Ky.

States Have More DP 'Chiefs'

LEXINGTON, Ky. — The number of people listed on the employment rosters of state DP departments continues to rise, but at a slower rate than even two years ago, and more such individuals are being classified as management, according to a report issued recently by the National Association for State Information Systems (Nasis).

In 1975 and even in 1976, the Nasis state survey showed a growth rate of almost 4%, compared with a 3.2% growth rate reported this year.

The Nasis report for 1977 attributed this drop partly to a reduction in the number of data entry employees and partly to the increase in the number of new types of managers for data base, data communications and security, the report said.

Salaries for various job categories varied widely, according to the report, with third-level management being paid as much as $42,501 per year in some states and as little as $20,000 in others. Second-level managers earned from a high of $34,669 to a low of $15,938 and a first-level managers earned from $29,800 to $14,140.

Salaries for systems analysts ranged from a high of $28,156 to a low of $12,000; systems programmers, from $26,738 to $13,650; application programmers, from $19,216 to $8,700; computer operators, from $14,904 to $7,500; and data entry personnel from $12,593 to $5,612.

The report said 46,250 people are employed in information systems work in the 50 states.

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Job Losses Predicted

Growing Service Imports Seen Hurting Canada

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — Canada estimates that by 1985, over half of the computing services its users acquire outside their own DP operations will be imported, Dr. Peter Robinson, chairman of the Canadian government's Interdepartmental Committee for Computer/Communications, said here recently.

That figure — approximately $1.5 billion or 52% of the "outside" computer services the nation uses — is based on a present trend of increases in imports that puts services obtained by Canada from foreign sources at about $155 million in 1975 and projects their value to $560 million by 1980, he stated.

Addressing TDF '78, the first international conference on transnational data flows to be held in the U.S., Robinson suggested this increase in imports calls into question the healthy forecasts made for Canadian Computer/Communications activities in the 1980s and raises concern about the number of jobs that will be created abroad rather than in Canada.

Canada's study of this situation, completed in the last two months, is one of the first to put dollar and job opportunity values on the complex flow of information and services across national boundaries.

The Canadian government estimated that 4,400 DP jobs — about 4.5% of the 95,000 DP-related jobs in that country in 1975 — were filled abroad by firms which provide computer services for Canada.

Canada's appetite for outside services should provide work for about 11,000 new systems analysts, programmers and computer operations and management personnel in 1980 — 8% of the 133,000 Canadian jobs in the field by then, Robinson continued.

This figure is expected to climb to 23,000 new jobs or 14% of Canada's 165,000 DP jobs in 1985, he said.

The nation's concern about jobs being exported through the use of foreign computing services is not limited to employment in the computer/-communications field, Robinson said. The importation of simple computing services is often followed by the importation of computer-based management or professional services, thus lessening the need for Canadian managers, planners, accountants and management support workers.

The Canadian official acknowledged that in 1975, 90% of these imported services were supplied to Canadian subsidiaries by foreign parent companies. "But we expect [this proportion] to decline to about 85% by 1980 and to between 75% and 80% by 1985," he said.

In addition, "it is not very likely that we will be able to offset this growth in imports by greater exports from Canada," Robinson stated. "We have found no evidence to suggest that even by 1985 our exports will be greater than about $60 million."

Canada has made projections about its computer services imports against a backdrop of increasing computer/-communications use, Robinson said. The government's study estimates that Canadian users spent almost $2.7 billion on these goods and services in 1975. More than 80% of this cost was incurred by in-house producers of data services to acquire and maintain the necessary staff, equipment, supplies, accommodations and data transmission facilities.

These total Canadian user costs will increase from the 1975 total to about $5.6 billion in 1980 and to $9.5 billion in 1985, he said. In addition, the government expects that more and more of these services will be obtained from other than in-house sources, growing steadily from 19% in 1975 to 25% in 1980 and to about 30% in 1985.

He warned against the use of "emotionally-loaded words" in discussing the issues — economic and others — involved in the movement of information and the provision of services across borders. "Protectionism" is one such word, he suggested.

Police Indicted For Net Abuse

(Continued from Page 9)

printer terminals throughout the city.

To obtain information from the system, a police officer makes a request to the officer on duty to operate the keyboard, according to Sergeant Edward Sharp, technical support manager of the Management Information Systems Division of the New York Police Department. The officer operating the terminal must keep a log of all requests for information, Sharp added.

Both police officers reportedly obtained the information they planned to use for unlawful purposes in October 1977. The indictments were the result of a joint investigation conducted by the office of the special prosecutor and the police department's Internal Affairs Division. Neither agency would comment as to how the system abuses were discovered.

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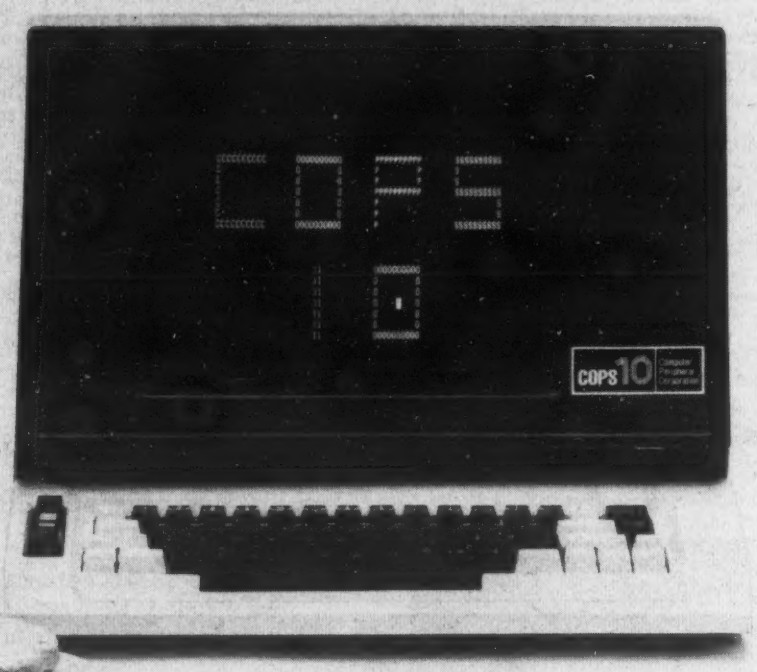

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Transborder Data an Economic Issue in Canada

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — When asked at a recent conference here to summarize Canadian legislation that regulates the flow of data across national boundaries, Dr. Peter Robinson, chairman of Canada's Interdepartmental Committee for Computer/-Communications, replied simply, "There is none."

No legislation, that is, that specifically addresses this amalgam of economic, social, political and legal issues. But Robinson warned the audience attending TDF '78, the first U.S.-hosted conference on transnational data flows, that Canada has a number of statutes that could be applied to the flow of information across her borders or to obtaining data services from sources outside her boundaries should the concern over these issues become great enough.

Canada's concern, Robinson stated, is growing on several different transnational data flow fronts. In its report entitled "Branching Out," the Canadian Computer/Communications Task Force expressed worries voiced by the nation's citizens "about the attraction of U.S.-based data processing and data communications services."

The task force concluded that positive competition and stimulation of Canadian efforts would best meet this challenge by advancing the development of computer and communications services in Canada.

But it also went on to say that "if a trend to increasing losses to Canadian data processing activities gains momentum, certain measures for protection might be considered."

Robinson also cited his government's "green paper on computer/communications policy," which stated the nation's concern about maintaining jurisdiction over companies operating in Canada that store and process business data outside the country and about the impact multinational corporations in the computer and communications fields have on Canada's general economy.

Business Losses

A third report authored by Canada's task force on "privacy and computers" put the concern being felt this way: "The principal problem . . . is not one of the privacy of Canadian data subjects being invaded by data about them stored in the U.S.

"It is rather that data processing and communications business may be lost to Canadians as a result of this foreign flow; that data in U.S. data bases might be peremptorily withheld abroad for a variety of reasons, including security regulations, court injunctions and so forth; that U.S. laws might change and leave Canadians less well protected.

" . . . As a sovereign state, Canada feels some national embarrassment and resentment over increasing quantities of often sensitive data about Canadians being stored in a foreign country," the report said.

Corporations would do well to remember that the concerns of governments are similar to their own, Robinson suggested. "No corporation — if it wants to stay alive — is willing to rely on its competitors to supply it with vital information, nor will it rely on the 'gentlemanly' behavior of its competitors and allow its own data and information to be stored by them."

Most of Canada's own examination of legislation that might affect transnational data flows stems from a desire to exercise some jurisdiction over companies operating in Canada while storing and processing their data outside.

There are laws defining the conditions under which Canadian government authorities and Canadian courts may have access to data stored abroad.

In addition to these disclosure laws, which Robinson acknowledged do place multinational corporations and others storing records abroad in a difficult position when they conflict with the legal requirements of another country, Canada has a human rights act, which was passed by its parliament last October. This statute applies only to federal government data bases, however, and does not refer to the problems associated with data stored abroad, he stated.

Several of Canada's provinces have privacy laws as well, as they have statutes controlling the activities of credit reporting agencies.

"Perhaps the Ontario act is the one with the most direct impact on transnational data flow," Robinson said. "Under this act, except for a written report of oral information obtained in accordance with the act, no information may be reported by an agency unless that information is stored in Canada." Furthermore, a credit reporting agency cannot sell or lease its files to any agency not registered.

Robinson noted that there is a great deal of additional legislation — such as the Canada Corporations Act and the Loans Company Act on the federal level and the Trust Companies Acts and the Insurance Companies Acts on the provincial level — that could, but haven't yet had significant impacts on transnational data flows.

"In other words, there are more questions, than answers at this time," Robinson said. "However, corporations should be aware of the growing concern of the Canadian government." He quoted Frank Maine, the parliamentary secretary to the Minister of State for Science and Technology, on the matter: "While the government of Canada, like many other governments in the developed world, has not yet completed its study of all the elements of a policy concerning transborder flows of data, it seems quite unlikely that a Canadian cabinet will decide in favor of an entirely unregulated regime.

"It appears to me that there are too many forces at play to allow ourselves, indefinitely, the luxury of zero regulation, no matter how reluctant we might be to leave such a stance," Maine said.

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Adams Receives Auditing Award

NEW YORK — The EDP Auditors Association (Edpaa) will present its first annual Joseph J. Wasserman Memorial Award to Donald L. Adams for his contributions in the field of auditing electronic data processing systems.

Adams is managing director of administrative services for the American Institute of Certified Public Accountants (Aicpa) and since 1975 has supervised Aicpa's computer services, office services and personnel divisions.

"In 15 years of service to the DP auditing profession, Don Adams has made an unparalleled contribution as practitioner, author and lecturer," John A. Gatto, president of Edpaa's New York chapter, said.

Adams is credited with assisting Aicpa's computerization of accounting bibliographic information, helping the society to produce annual topical indexes covering approximately 15,000 books, pamphlets and articles related to accounting.

For Juvenile Justice Program

Ind. County Prosecutor Gets First Mini Promis

By Howard A. Karten
CW Staff

INDIANAPOLIS — The first version of the Prosecutor's Management Information System (Promis) that can be customized by users and then run on a minicomputer was installed here recently in the Marion County prosecutor's office.

The system, which was installed by personnel from the Institute for Law and Social Research (Inslaw) in Washington, D.C., is being used to run a version of Promis devoted exclusively to the administration of juvenile justice. Inslaw, a nonprofit group, originally developed the system for use on mainframes in 1971 under contract to the Law Enforcement Assistance Administration (LEAA) of the U.S. Department of Justice.

Promis was designed to bring the advantages of DP to judicial systems throughout the country. The idea behind the system, according to Inslaw, is to use DP techniques to collate, cross-reference and track much of the paperwork involved in the administration of justice, thereby freeing prosecutors to exercise more control and creativity in pursuing their cases.

An additional goal of the package is to bring prosecutors more modern management techniques such as better scheduling of manpower, cases and witnesses.

The mini Promis system in use here is already providing benefits for Marion County, Chief Prosecutor James F. Kelley said. The system has centralized the data collected for use in setting bail and has eliminated the duplication of effort which was formerly required. It produces subpoenas, which used to be manually produced, and provides data on the average length of sentences which can be used to compare different courtrooms.

Marion's Special Aspects

The system here has two unique aspects. First, it is the first installation of Promis software on a minicomputer. Second, the minicomputer version of Promis comes with an interactive, tailoring program which allows the user to customize the software to the exact specifications of his jurisdiction. The program is designed to provide a customized version rapidly, without the need for extensive modification and testing of the system by DP technical personnel.

The system installed here is a Digital Equipment Corp. PDP-11/34 with 256K bytes of memory, two 14M-byte disk drives, two DEC VP-52 CRTs, a DEC LA 180 printer and a TJE 16 800/1,600 bit/in. tape drive.

The operating system used to run the equipment is DEC's CTS 500, while the data management system is RMS 11K, which is a multikey, Isam record management system. All software for the system, which was produced by Inslaw, is written in a subset of ANS '74 Cobol.

The concept of tailoring a piece of software has long been familiar to DP users. In most cases, programmers encode parameters which are then read by the system in a batch run to generate ("gen" or "sysgen") the particular software. Making the process interactive was considered more palatable and less formidable to users in the jurisdictions, who are less familiar with DP.

The interactive customizing ability of the mini Promis system allowed Inslaw to "tailor the system [for Marion County] in five days, as opposed to the 26 weeks it would have taken to alter the code," according to Dean Merrill, vice-president of Inslaw. The system can also be retailored by a user after it is installed.

In addition to the new mini Promis installation, there are 17 others, all using mainframes. Several of these are considering switching to the mini Promis, according to Merrill, and some 73 other judicial jurisdictions are said to be considering or planning Promis installations.

Although the software and documentation is provided free of charge to jurisdictions wishing to use Promis, users must install and operate their own DP equipment. The less-expensive mini Promis system should provide a good inducement to more widespread use of the system.

Although Promis has been available since 1971, courts and district attorney's offices have been slow to adopt the free system for two reasons, according to William A. Hamilton, president of Inslaw.

First, courts are run by lawyers, and lawyers generally do not have a background in DP. Secondly, it often takes two or three years or more to fund local and state jurisdictions.

Responding to a question on how the courts have been able to survive in the past without the use of Promis or any other DP systems, Hamilton said, "the courts are in terrible shape . . .

"FBI statistics end when an arrest takes place, whereas half or more of all felony arrests are dropped in the court system, just outright dismissed, without any plea bargaining . . . If the FBI had been doing more [in the area of statistics] than just counting arrests, we wouldn't be only now finding out that these arrests are of poor quality and will not stand up in court," he said.

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DDP Decision Should Be Financial, One User Says

By Edith Holmes
CW Washington Bureau

GAITHERSBURG, Md. — The decision to adopt a distributed data processing (DDP) system shouldn't pose scientific questions for the user. A decision for or against DDP "ought to be a financial one," James B. Wetterau of New York Telephone Co. said here recently.

Speaking at a conference jointly sponsored by the IEEE/Computer Society and the National Bureau of Standards, Wetterau said New York Telephone's venture with a distributed data base of phone repair records does highlight some of the pluses and minuses of the DDP approach.

Hardware Flexibility

Certainly, a distributed data base offers increased hardware flexibility, he stated. Hardware units can be placed in multiple locations, more redundancy is available at less cost and system growth can also cost less because it is modular. Overall system reliability is improved as well, Wetterau said.

DDP also can offer "tremendous" communications savings. "Telephone companies serving widely dispersed areas can realize maximum savings of their data link costs by wisely selecting the locations of their front-end processors, placing them as close to user clusters as possible," he noted.

Cheaper Approach

Overall, DDP appears to be cheaper than a centralized system, Wetterau added. New York Telephone's system employs one IBM 370/168 and nine Digital Equipment Corp. PDP-11/70s. The DEC machines provide backup for the 168. These CPUs "are an effective spare 168 with redundancy to boot," he said. A second 168 would have doubled the system's cost of $3 million.

However, on the negative side of the question "Is DDP worth it?" is the fact of falling prices for large CPUs. Reduced minicomputer costs initially made DDP systems attractive, Wetterau commented. But "the advent of the IBM 3033 and Amdahl Corp. 470V/7 at costs lower than those of the 370/168 of two years ago must force a reexamination of the hardware advantages of a DDP system," he said.

In addition, minis also encouraged DDP systems because these CPUs promised simple front-end software with its associated reliability and ease of maintenance, Wetterau stated.

In order to do everything users want today, however, minicomputer operating systems are becoming as complex and as demanding of CPU resources "as anything IBM sells," he said. This move from simple to complex operating systems has been obscured by the drop in hardware prices, the New York Telephone Co. executive added.

"As you fragment your system with smaller hardware units, communications flexibility decreases," Wetterau continued. New York Telephone found this situation "intolerable" and finally solved the problem with a third-level of hardware — a dual PDP-11/34 devoted to routing messages among the processors and the CRTs in the distributed system, he said.

"The decision for or against a DDP system is certainly not clear cut," Wetterau stated.

NBS/IEEE on DDP

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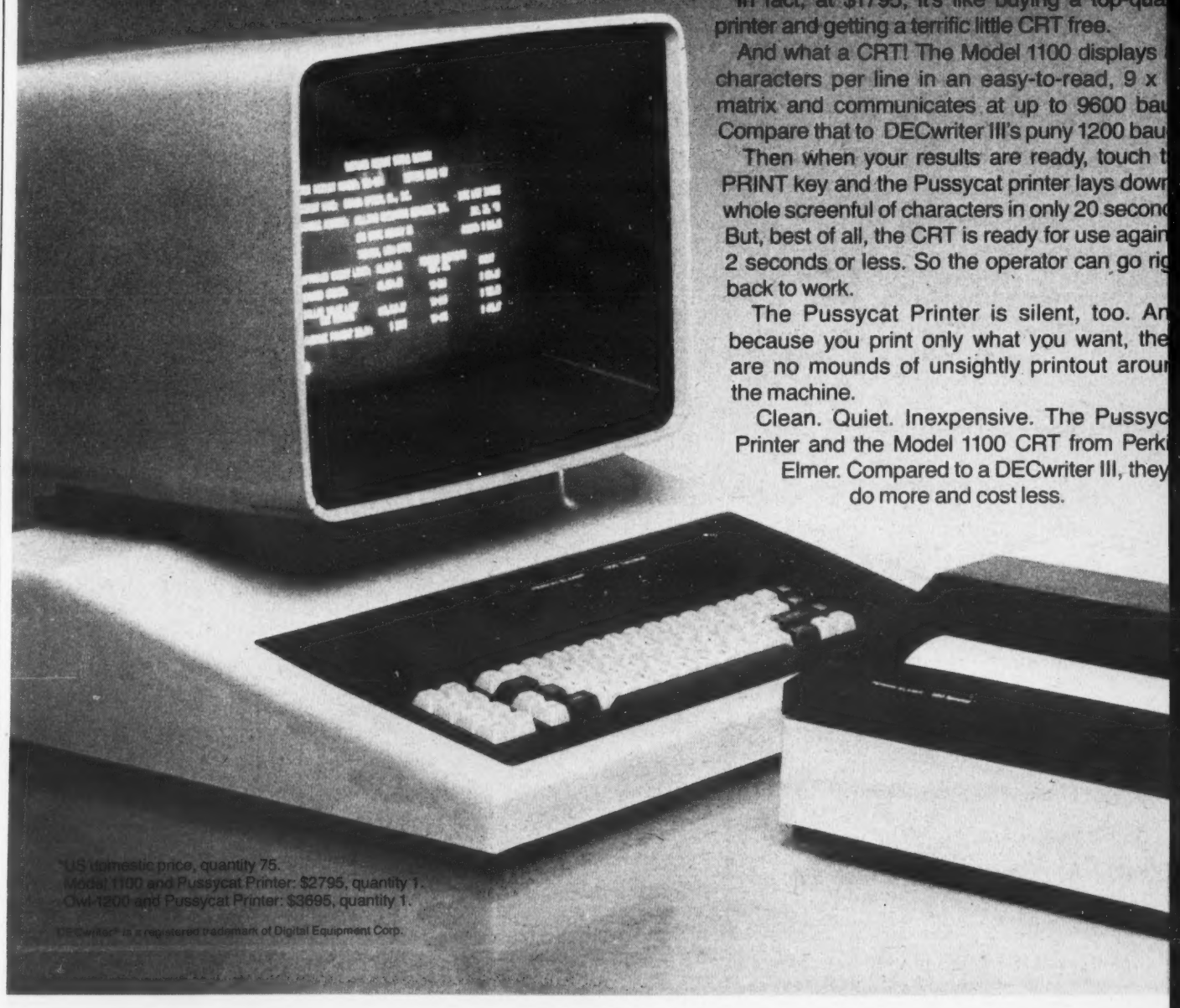

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DDP Helps Ma Bell Handle N.Y. Repair Calls

By Edith Holmes
CW Washington Bureau

GAITHERSBURG, Md. — A man's telephone goes on the blink in New York City. Frustrated, he dials the repair number — "611." What happens?

That phone number connects him to a computerized recordkeeping and trouble-reporting system for Ma Bell's repair service bureaus, James B. Wetterau of the New York Telephone Co. told attendees at the recent "Distributed Processing Trends and Applications" conference sponsored here by the National Bureau of Standards (NBS) and the IEEE/Computer Society.

While a local repair service bureau will still handle the man's troubles, distributed data processing (DDP) has enabled New York's phone company to centralize its service attendants, Wetterau said.

Called the Loop Maintenance Operations System (Lmos), the computerized repair system depends on a data base of phone records distributed among an IBM 370/168 and nine Digital Equipment Corp. PDP-11/70s configured in three groups of three machines. One-third of all the transactions on the system consist of looking up telephone records, Wetterau stated.

NBS/IEEE on DDP

That is one of the first tasks of the repair service attendant who answers the call of the man with the troubled phone line. The attendant's job is to take the customer complaint and enter the man's phone number into Lmos via a CRT. The system comes back with information about the customer's phone line, and the attendant fills in the blanks on the screen requesting a description of the problem and an appointment date, Wetterau explained.

The conversation is concluded, and the attendant completes his trouble report and enters it into the system. A printed message, called the basic output report, is then generated at the terminal in the repair service bureau responsible for the man's phone service, Wetterau explained. That report contains the trouble data plus additional line history and previous trouble history.

As the problem on the man's line is cleared, various status codes are entered into Lmos. When the difficulty is resolved, the trouble report is "closed out" and becomes part of the line's history, he added.

Records Made Available

Lmos has improved the New York phone company's service to its customers by increasing the availability of their records. Records cannot be lost or misfiled, and as a result, communications between customers and repair service attendants have improved greatly, Wetterau said.

The system also eliminated the need for clerks to search physical line records at the local repair service bureaus. The repair service attendants who access the system today are located in two centralized bureaus, and the phone company has reduced by more than one-third the number of clerks needed at this point in the repair business, Wetterau reported.

Lmos began, "as so many DDP systems do," with a central computer system based on an IBM 370/155 and then a 370/158, he said. The system evolved into a distributed structure as daily traffic increased. Lmos currently handles 70,000 transactions a day and as many as 16,000 transactions during the busy hours of 10 a.m. and 3 p.m., Wetterau added. Eventually, the phone company expects busy hour transactions to number 20,000.

Planning for sufficient host system and front-end processor capacity and dealing with problems encountered in communications among the CPUs characterize much of the history of the New York Telephone Co.'s efforts to distribute Lmos.

While the decision was ultimately made to upgrade the 158 to a 370/168, Wetterau

(Continued on Page 22)

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Security More Than Encryption, Users Told

By Edith Holmes
CW Washington Bureau

GAITHERSBURG, Md.— Concentration on any one security aspect — such as encryption — in a distributed data processing (DDP) system can lead the system manager to a false sense of security and a potentially higher overall level of risk, according to Captain Paul A. Karger of the U.S. Air Force.

"Although encryption is essential to protect the actual data communications links [in a system], higher level protocols can cause security compromise despite the best encryption schemes, Karger told a recent conference on DDP held here by the National Bureau of Standards (NBS) and the IEEE/Computer Society.

Construction of secure distributed systems will require attention to such areas as naming, interprocess synchronization, downgrading of information, security administration and authentication, Karger said.

The wiretapper can be controlled through cryptography, and there are a variety of military and commercial sources for encryption algorithms, Karger noted. But encryption doesn't easily solve the "real problem in internal computer system security: how to decide which users get access to what data," he said.

Internal Attacks

Internal attacks take two forms: direct penetrations by exploiting existing bugs and "Trojan horse" attacks, Karger said. He explained that the "Trojan horse" is "a clandestine software modification that actively and maliciously attempts to copy" sensitive or classified information to an unauthorized user.

Tiger teams — groups assigned to break system security — have successfully exploited bugs in such systems as IBM's OS/360/370 and VM/370; Bolt, Beranek and Newman's Tenex; Univac's Exec VIII; Honeywell Information Systems, Inc.'s Gcos and HIS' Multics, Karger stated, adding that only a small portion of all system penetrations are reported in published literature.

A Trojan horse is difficult to detect because it can be introduced anywhere from the manufacturer to the end user, and programs work correctly with the software modification in place.

As a test, Karger said the Air Force placed a "benign" Trojan horse into an HIS operating system. The code was distributed to every site using that operating system, and the modification wasn't found until a year later at General Motors during an intensive security overhaul.

The possibilities for inserting a Trojan horse into a distributed system are "incredible," Karger stated.

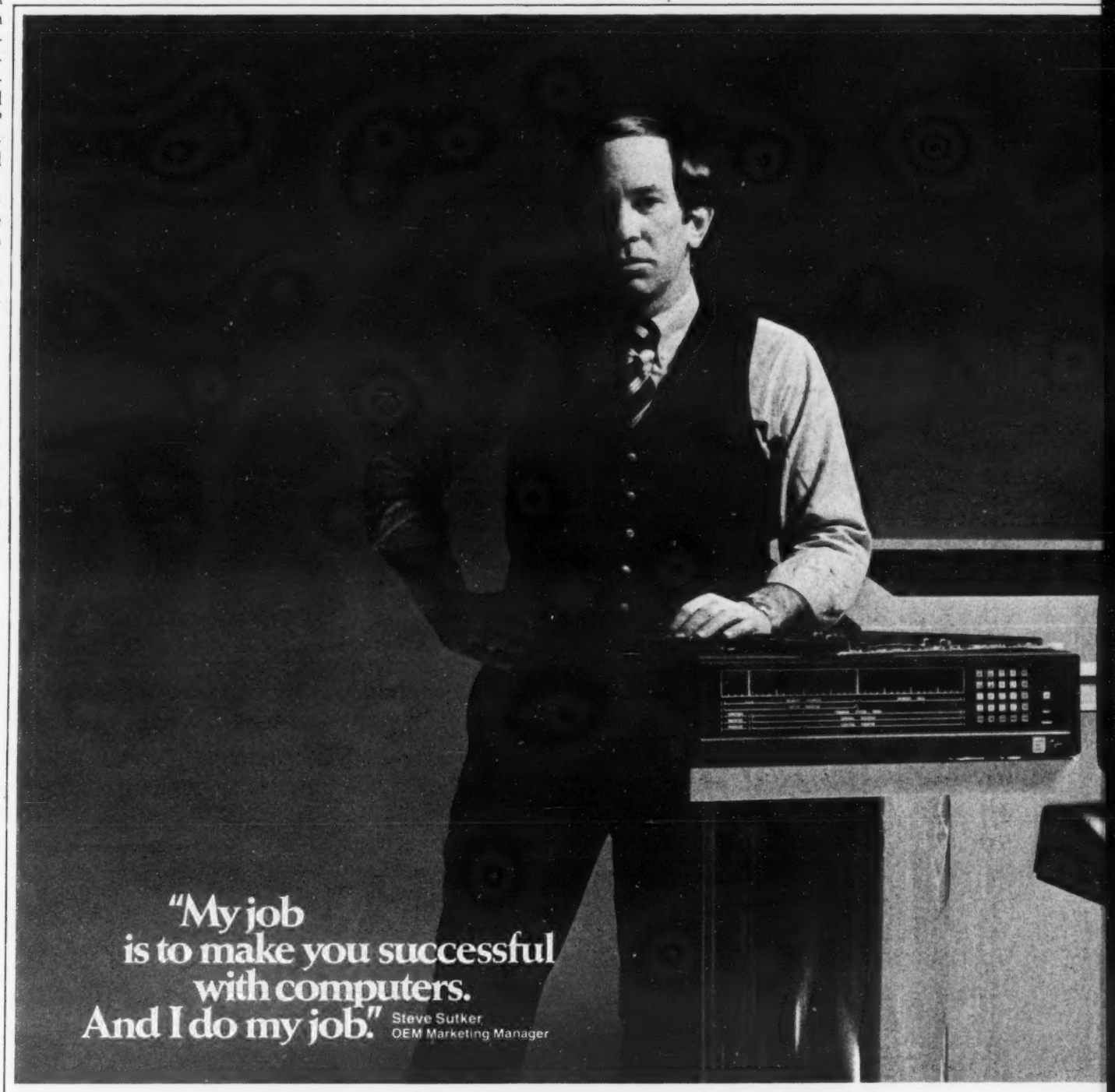
To guard against the insidious Trojan horse as well as the normal bug, the Air Force has applied "security kernel" technology, which involves isolating security-sensitive code from the rest of the operating system, he explained.

The security kernel of an operating system mediates all accesses to information and so acts as a policeman, assuring that the desired system security policies are enforced. By sufficiently simplifying the security mechanisms of a system and isolating them from the rest of the operating system into a "secure kernel," it is possible to verify the correctness of the mechanisms mathematically, Karger said.

So far, security kernels are only available for minicomputers; kernels for large mainframe operating systems are still in development. But a distributed system containing large processors can be made secure by the strategic placement of security kernel-based communications processors in the network, Karger said.

Karger's work on host-to-host protocols is available for 75 cents from the publishing services of the Institute for Electrical and Electronics Engineers at 345 E. 47 St., New York, N.Y. 10017. The paper's publication number is CHI365-6/78/0000-0053.

NBS/IEEE on DDP



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Widespread Popularity Predicted

Future Communications DDP Key: Branscomb

By Edith Holmes
CW Washington Bureau

GAITHERSBURG, Md. — Advances in communications are the key to the future health of distributed data processing (DDP), IBM's chief scientist said at a recent conference here cosponsored by the National Bureau of Standards of (NBS) and the IEEE/Computer Society.

Improved digital facilities and switched services and the emergence of more value-added communications offerings will help DDP attain the popularity of which it is capable among business users, Dr. Lewis M. Branscomb suggested, at the meeting entitled "Trends and Applications: 1978 Distributed Data Processing."

"Eventually, communications systems will depend on 11- to 14- GHz satellite networks with earth stations," Branscomb, who is also an IBM vice-president, added. He believes satellite technology may have a life span of 50 years, but cautioned that "satellites may be a transitory technology on the way to fiber optics."

DDP can offer users a wide range of capabilities because of the mix of technologies it provides. It can also help lower personnel costs, in Branscomb's view.

Quoting International Data Corp. (IDC) figures, Branscomb said that of a total of $30 billion spent by users today on computing and communications, 19% goes for communications, 46% for computer systems and 35% for salaries. The scientist added his belief that most organizations actually spend close to 50% on personnel because they don't take advantage of the available technology.

CW Photo by E. Holmes

Dr. Lewis M. Branscomb

Salaries Major Cost

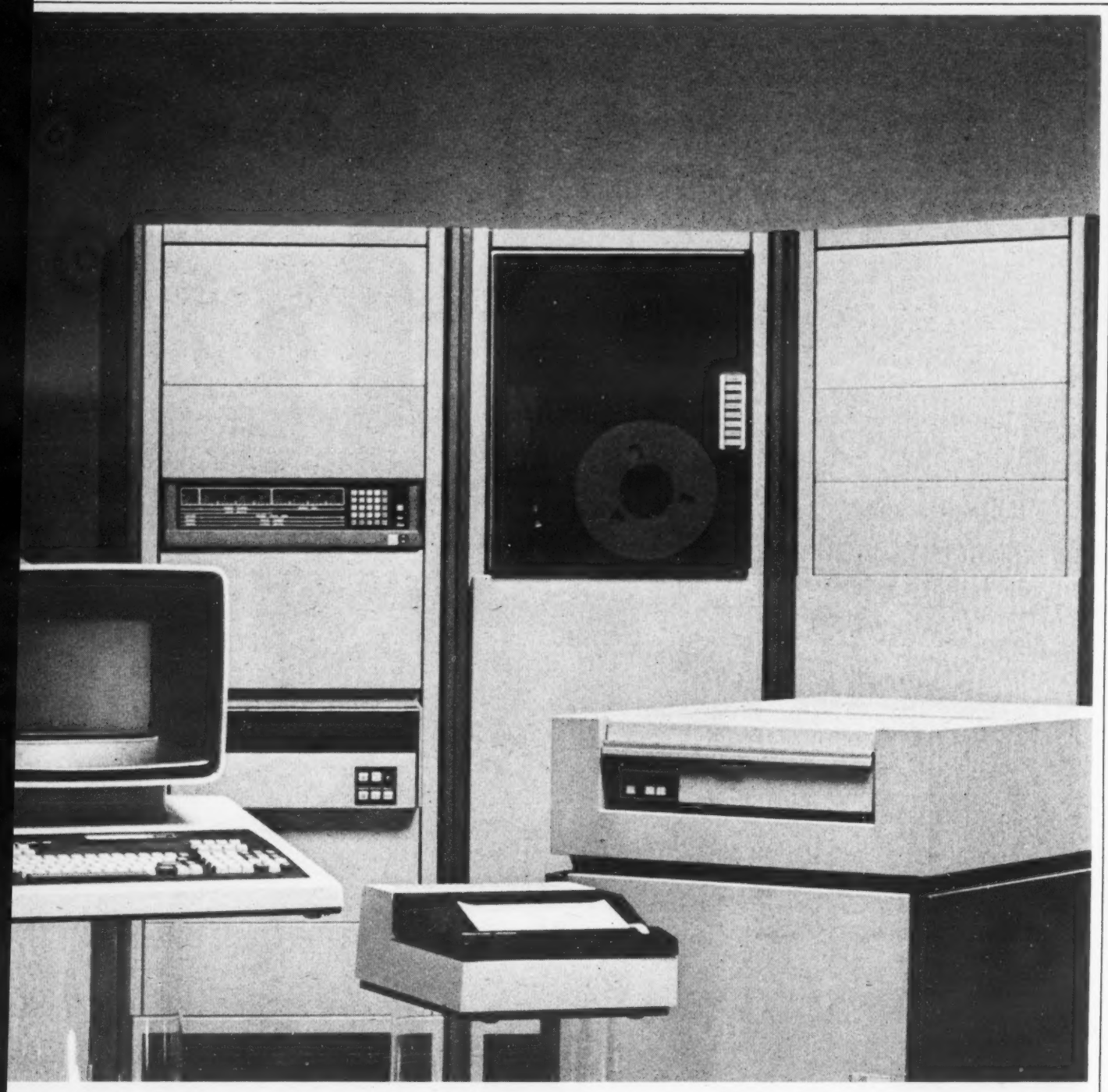
If salaries continue to increase at a rate of 6% a year while communications costs decrease 11% annually and the cost of systems declines 15% each year, salaries will eat up 73% of the total amount spent on computers and communications by 1983, according to IDC projections, Branscomb said. He believes, however, that people costs will decline to one-quarter of the total cost to users of computers and communications because of technological improvements and their use by 1983.

In Elementary Stages

Today's DDP is "almost all elementary" Branscomb said. In general, the distributed data is not shared among several locations. Much needs to be done before DDP will be sufficiently sophisticated to provide the many approaches that are required to handle a variety of applications at once, he stated.

In addition to improvements in communications services, better methods of manipulating data bases must be addressed. The partitioned data base is best for updating while the replicated data base does its finest work where "inquiry only" is involved, for example, Branscomb said. "Unfortunately, the real world needs of most businesses fall between these two kinds of data bases and applications," he commented.

NBS/IEEE on DDP



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Congress Warned Networks Threaten Privacy

By Marguerita Zientara
CW Staff

WASHINGTON, D.C. — Today's advanced teleprocessing technology can pose a serious threat to personal privacy if not properly controlled, according to a report to Congress issued recently by the Office of the U.S. Comptroller General. The report said, however, that "a high level" of protection is possible in the merging of DP and communications resources into federal computer networks.

Entitled "Challenges of Protecting Personal Information in an Expanding Federal Computer Network Environment," the report was issued in an attempt to summarize the lessons learned during the past several years concerning the ability of computer networks to adequately protect private information. Recent studies include one made in 1975 of the Federal Information Network (Fednet), a proposed joint General Services Administration (GSA) and U.S. Department of Agriculture computer acquisition. Another report was made on the proposed computerized Tax Administration System (TAS), a project that was terminated in 1978 with privacy as a major issue.

Biggest Threat

The major threat to personal privacy, according to the report, stems from the misuse of personal information by untrustworthy or dishonest individuals who have authorized access. The report recommended that risk can be substantially reduced through the use of such managerial controls as segregation of employee duties, personnel screening, activity monitoring and effective auditing.

A secondary threat to security is from malicious penetrators, the report said. These people can penetrate a system by using an operating system function in a way unanticipated by designers or by exploiting some anomalous behavior of the operating system, the report indicated. Further, they are frequently aided by the fact that operating systems designers have assumed that users will not deliberately attempt to force a malfunction of the system.

A major problem in the area of computer security is defining the level of protection required by personal information, the report said. Part of this difficulty arises from the need to choose between two alternatives: that all personal data, regardless of how trivial, will be afforded protection at the same level; or that data will be categorized by degree of sensitivity or confidentiality with a level of protection assigned to each category.

In discussing the relative threats to privacy inherent in various network systems, the report listed, in order of increasing risk, the following types: common carrier; single computer, multiple users — within that category, dedicated hardware, shared hardware and shared data; multiple computer, mulitple users — within that category, fixed allocation of resources and automatic resource balancing.

As for protecting the privacy of information through hardware, the report suggested a number of means that will ensure "a high level" of protection in a multiuser environment. The major suggested method in that vein is to segregate sensitive data and its processing from all other data in a policy of "isolation." To accomplish this, according to the report, isolation mechanisms must be present that cannot be bypassed by users exercising normal user-programming control of the system.

There are two basic architectural approaches that provide this type of isolation — virtual machine systems and descriptor-based systems, the report noted. Virtual machine systems furnish an isolated environment through techniques which create for each user a complete system dedicated solely to the user's purpose. Descriptor architecture isolates users by providing each with a totally independent address space.

Other methods include the "kernel concept," in which all security-sensitive elements of a system are placed in a "security kernel" at the highest level of protection, or innermost section of the system, while other functions are

(Continued on Page 19)

Program to Catch Welfare Cheaters

N.Y. Legislator Calls Project Match a Failure

By Ann Dooley
CW Staff

NEW YORK — Brooklyn Assemblyman Charles E. Schumer has charged that the federal government program aimed at finding and reducing welfare fraud is "an utter failure" because of "tremendous confusion" and errors in computer checks here.

But a spokesman for the city's Human Resources Administration, calling Schumer's charges "a precipitous use of a draft report to grab headlines," maintained Project Match is successful and cost-effective.

Project Match was designed by the Department of Health, Education and Welfare (HEW) to reduce welfare fraud by matching welfare records against various payroll records, other federal pay programs and Social Security numbers (SSN) [CW, Nov. 21]. It is the SSN matching, the most recent program in the project, that has aroused Schumer's wrath.

The computer matches are used only as leads for manual investigations and follow-ups, according to the Human Resources spokesman. But Schumer, chairman of the state Assembly's Subcommittee on City Management, contended the "bungled files" require the interviewing of so many welfare recipients who turn out to have legitimate claims that the system is "cost-inefficient."

Schumer based his complaint on a draft report issued by the Human Resources Office of Loss Analysis and Prevention indicating that the city agency had submitted 802,836 names of welfare recipients and their SSNs to the Social Security Administration in 1976 and that 287,889, or 35.8%, could not be confirmed.

The report also noted, however, that a sample totaling 4,465 of those not listed as eligible for welfare were interviewed and that 75% were found to be victims of errors.

Most of the errors can be traced to either the Human Resources Administration's manual files or to errors made in moving the information from the manual files to computer tapes for Project Match, Schumer said.

But the Human Resources spokesman noted the report, which was leaked to Schumer's office, was still in draft form and claimed, "The statistics were not calculated as scientifically as they should have been and are invalid."

Some problems have occurred with the SSN tape, he admitted, but no more than would be found while setting up any kind of a system.

The SSNs are received on an annual basis; because of the time lag in getting the data, people may have moved, changed their names or made changes in their welfare status, he added.

In any case, he said, the actual number of unverified numbers is only .5%. Those are unverified for many different reasons and are being investigated.

Computer matches in fiscal year 1977 led to 7,322 welfare cases being taken off the books for a savings of $27.9 million here, according to Dr. Blanche Bernstein, the Human Resources administrator. The city agency expects to realize a savings of $31 million by the end of this fiscal year.

Nets Termed Privacy Peril

(Continued from Page 18)

placed at lower levels, the report stated. In opposition to this system is another possible method in which the security-sensitive elements are scattered throughout the system.

A very expensive security method is data encryption, which involves the use of an encryption device at the point of data transmission and a decryption device at the point of data reception.

The report recommended that because of the cost involved, a definite need should be established through a formal threat analysis prior to a decision to employ this technology.

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Career Pathing Called Way to Limit Turnover

By a CW Staff Writer

NEW YORK — A career path can contribute to greater efficiency and motivation of employees, can keep people from leaving a company and can keep DP personnel from looking elsewhere for challenge and opportunity.

This was the message delivered by George Florit, president of the Burton Group, Inc., to a workshop on career pathing for operators and programmers at Computer Expo '78 here recently. Florit's company specializes in trying to improve the efficiency and productivity of corporate DP organizations through better utilization of personnel.

So far, management has not recognized the importance of the human factor in productivity and effectiveness, Florit said, adding that merely defining a career path can't work unless management also addresses other issues affecting it.

While making no specific recommendations about career paths that might be followed by programmers, systems analysts and operators in a company, Florit did make some suggestions to workshop participants on how and why to set up a career path.

Drawing on his experience in consulting with users, Florit commented that in some companies, an individual no longer had to be a manager to get visibility within the corporation. "There are nonmanagerial positions, equivalent to first- or second-level management, which are being filled by high-level individual contributors," he said.

A career path is a defined position structure which indicates the transferability of knowledge from one position to another, according to Florit. In order for this career path to work, the company must have a good understanding of the requirements for each job. The sum total of these jobs must equal the mission of an organization, Florit told the group.

Looked at in this way, there are three essential characteristics of jobs in an organization, Florit said. First, there should be no duplication of jobs; second, no omission of jobs; and third, no conflict between jobs. Further, organizations must examine what relationships must be established and maintained to accomplish the mission, he added.

Building a task-position matrix, Florit said, will tell an organization if it has achieved these three goals and if it has achieved transferability of knowledge. The matrix, which consists of tasks listed along one axis and positions along the other, can be used to validate the job structure.

Florit, whose company constructs these matrices as part of its consulting work, said the matrix should also tell a user how and where an individual acquires skills and knowledge.

Defining a task as a "procedural activity" and a skill as a "body of knowledge needed to perform the task," Florit said his company recommends performing skills definitions to create a career path.

Two of the advantages of a defined career path, according to Florit, are that employees of an organization can be guided in the advancement process and new employees or potential applicants coming into a company can be evaluated for their knowledge and worth. After explaining the concept of "quit and reapply to the company" in order to get a raise, Florit claimed that the institution of a career path and matrix prevents this employee attitude.

Once a career path and skills matrix are set up, Florit said, employees can be "profiled" against the matrix to identify weak skill areas. The sum total of these weaknesses should define an organization's training effort.

Wang System Set As Prize at NCC

ANAHEIM, Calif. — The slogan at the Wang Laboratories, Inc. booth at the National Computer Conference will be "Let's Make a Deal" with a contest prize that will turn even Monty Hall green with envy. Wang is giving away a desktop business computer

Wang PCS-II

which some lucky attendee will walk away with on the last day of the show.

The system is a PCS-II with 8K internal memory, 89.5K storage on a single minidiskette drive, a CRT and a full alphanumeric keyboard. It will be on display throughout NCC and will be given to the winner following a drawing at the Wang booth on June 7.

Any NCC attendee who watches a demonstration of Wang's new virtual storage computer is eligible to enter the contest. Drawing cards will be handed out following each demonstration and placed in a drum from which a Wang official will draw the winning card.

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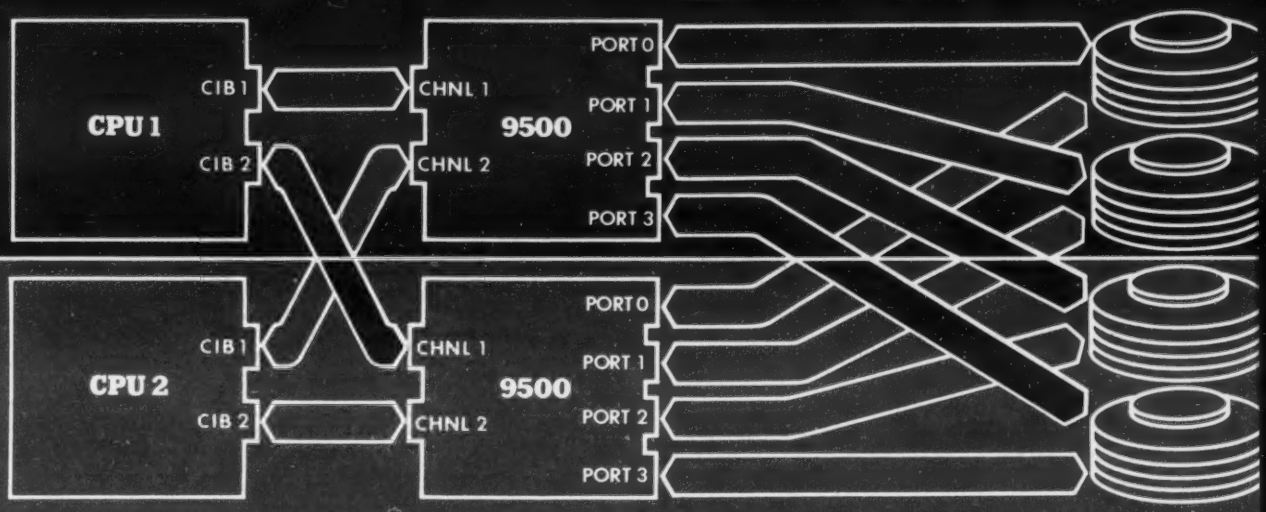

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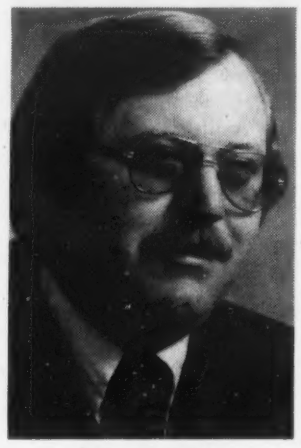
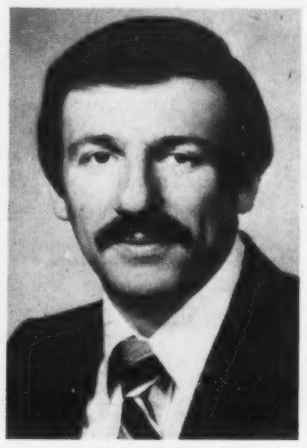
Managers on the Move



John R. Blake



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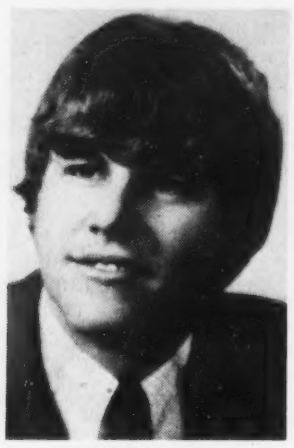

Randall G. Clyma

LaGrange Ratcliffe, Jr.

DR. MELVIN FERENTZ has been appointed to the newly created post of director of computer services at Rockefeller University in New York.

Prior to joining Rockefeller, Ferentz was a professor of physics and director of the School of Science Data Acquisition Facility at Brooklyn College, City University of New York (CUNY), where he also held the posts of director of the Computer-Assisted Instruction Research Center and associate director of the CUNY/State University of New York Institute for Research in Learning and Instruction with responsibility for a statewide 13-campus teleprocessing network.

Ferentz received his undergraduate degree at Brooklyn College and received his Ph.D. in physics from the University of Pennsylvania.

•••

LEE R. HERRINGTON III has been appointed vice-president for data processing at Progressive Casualty Insurance Co. in Mayfield Village, Ohio.

Herrington joined Progressive in 1974 as a financial analyst and in 1977 became DP manager, a position he held until his recent appointment.

The company's youngest vice-president, the 30-year-old Herrington received his B.A. from Yale University and spent four years in the investment business before joining Progressive.

•••

JOHN R. BLAKE has been promoted to the position of manager, information systems technical services, for Drew Chemical Corp. of Boonton, N.J.

Blake joined the chemical firm's DP department in 1977 after several years as a branch technical manager with Honeywell Information Systems, Inc.

In addition to managing Drew's Boonton computer center, Blake will be responsible for providing technical services related to both equipment and software for Drew facilities worldwide.

The new appointee received a B.S. in mathematics from Adelphi University and also holds a certificate in data processing from New York University

•••

LAGRANGE RATCLIFFE Jr. has been named manager of corporate information systems and services and RANDALL G. CLYMA, manager of the corporate data center at LaBarge, Inc., a St. Louis-based manufacturer of specialized process or precision tubular products.

Both are employed at the company's corporate data center in Tulsa, Okla.

Since joining LaBarge in 1972 from Elmer Fox, Westheimer & Co., certified public accountants, Ratcliffe has served as director of the corporate data center.

Clyma has been with LaBarge since 1973 as a computer programmer and assistant to Ratcliffe and previously worked as a computer operator for Seismograph, Inc.

•••

JERRY R. RAMBO has been named manager of management information systems facilities planning, and MILARD F. BANKER has been appointed manger of the data center at Owens-Corning Fiberglas Corp. headquarters in Toledo, Ohio.

Banker, who was previously project leader for building materials group information systems, replaced Rambo as data center manager.

Banker attended Rutgers University.

Rambo started at Owens after finishing high school and was one of the company's first programmers.

•••

COL. JOHN Z. DILLON will become chief of staff of the Electronics Systems Division at Hanscom Air Force Base in Massachusetts. He will replace COL. AVON C. JAMES, who will be transferred to Scott Air Force Base, Ill. to become deputy commander for data automation at the Air Force Communications Services Headquarters.

James has been chief of staff at Hanscom's DP division since 1973.

Dillon has commanded the Rome, N.Y., Air Development Center since mid-1976.

•••

DEAN A. PFENNIG has been appointed manager of computer production control at Philip Morris U.S.A. in Richmond, Va. Pfennig has been a staff systems analyst since joining the company in March 1977.

Prior to joining Philip Morris, Pfennig was a staff systems analyst for Babcock Wilcox in Akron, Ohio.

He holds a B.S. degree in management science from the University of Buffalo.

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Going to DBMS Hard Work, Users Warned

By Howard A. Karten
CW Staff

NEW YORK — Prospective users of a data base management system (DBMS) must be prepared to put in a lot of hard work before deciding to go with a DBMS — and then must be prepared for the problems that will develop after the system is installed, according to Thomas L. Pettibone, manager of management information systems for BMW of North America, Inc.

Pettibone emphasized at a recent conference here that the use of a DBMS can be highly advantageous to a company, but that comany must be prepared to "pay the piper" in all respects.

This means, he said, that a company must first be willing to sit down and ask itself the hard questions of what will be gained from a DBMS, how it will be used and who will be using it.

However, "going to a DBMS is a tough job, and your management must be 150% behind you. Going to a DBMS will mean disruptions and problems and will amplify the already existing problems in your company," he warned.

Pettibone, who stressed he was speaking from experience and not as an expert, said potential users must also be willing to look at the darker side as well as the bright side of DBMS. Users must be willing to pay for reduced operating efficiency, a data base administrator, additional hardware and software and personnel training on top of software costs.

Reduced operating efficiency results because the DBMS must do more than the software it replaces. Although the benefits will show up in other areas, such as quicker responses to management requests for additional information or file or program changes, hardware will typically be working significantly harder than before the software was installed, Pettibone said.

The requirement for a good data base administrator (DBA) cannot be overemphasized, Pettibone contended. "A good DBA is worth his weight in gold to the corporation and it is not worth going to a DBMS if this position is not staffed properly," he said. The DBA's position should be high in the corporation.

The costs of additional hardware and software and additional main memory must also be considered, as well as the need for constant and continuous training of both programmers and management.

Users considering the purchase of a DBMS often start out with an unrealistic set of expectations, according to Pettibone, and therefore must carefully list what they hope to accomplish by buying such systems. Data bases will not meet all their expectations, he pointed out.

A DBMS will not provide the immediate analysis and display of corporate trends and results, he noted, and it will not provide situation analyses or models for alternative corporate strategies. Nor will it provide quick concentration of diversified, decentralized businesses or a "totally integrated system," he said.

However, there are some very definite advantages to be gained by using DBMS, Pettibone said, such as:

- A quick adaptation of systems to new ventures and new ways of doing business.
- Protection from downtime-caused problems, such as failure to complete an update.
- An increase in programmer productivity, since not all functions, (for example, checkpointing) must be performed in all programs.

There are three fundamental reasons for using a DBMS, Pettibone observed. These are the ability to respond more quickly to changing corporate needs, an improvement in data integrity since users make more use of the data and a built-in audit and recovery capability.

Selection of a DBMS should be a 10-step process, Pettibone believes, beginning with defining and ranking the uses for a system. After doing this, the same work should be done on objectives for a DBMS.

Next, a corporate user must establish and staff a data base function, taking particular care to define the functional corporate interfaces with the eventual users. Only after doing all this preparatory work should data relationships be defined and the required data base structure be specified.

Next, the published features of available systems should be tabulated and weighted against the user's objectives and hardware/software plans, Pettibone continued. It is also important to contact and visit users of sytsems which most closely match the user's plans.

After selecting a DBMS based on features and recommendations by users, the corporate user should be trained by the vendor and engage in planning with joint consultation by the vendor. Finally, Pettibone said, frequent consulting with the vendor after implementation is highly desirable.

Summing up for the audience of DP executives, Pettibone recommended two publications as particularly helpful. These are James Martin's *Principles of Data Base Management* and Richard Nolan's article in the *Harvard Business Review* of September 1973 called "Computer Data Bases: The Future is Now."

DDP Aids Ma Bell With Repairs

(Continued from Page 15)

told the audience that Amdahl Corp.'s 470V/6 was seriously considered. The phone company began looking at these two processors when the 158 approached its maximum capacity — defined in this case as the CPU's ability to respond to 95% of the trouble calls during busy hours in 10 seconds or less.

In its study of the Amdahl machine, New York Telephone visited Bell and non-Bell users and found everyone "very happy" with the 470V/6. All were sophisticated users "glad to get away from big blue," Wetterau said.

The phone company selected DEC's PDP-11/70s in part because of directions from Bell Laboratories, Wetterau stated. Those front-end processors handle 45% of the total Lmos load and the 168 manages the rest.

The lack of communications versatility in this distributed system was solved with the installation of a cross-front-end processor — in this case, a dual PDP-11/34. This processor is connected to all the computers — host and front-end CPUs — via 9,600 bit/sec lines and routes messages from the CRTs to the correct processor.

Lmos uses a host and a front-end data base structure, Wetterau said. IBM's IMS was used for the 168.

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Sets Up Training Program

Bank Finds Handicapped DPers Productive

By Ann Dooley
CW Staff

NEW YORK — A program aimed at opening DP jobs to the physically disabled has shown handicapped people are "equally productive compared with others, if not more," according to Charles LaBelle, vice-president of human resources at the Manufacturers Hanover Trust (MHT).

The handicapped people who work at MHT are reliable and loyal; because they appreciate the opportunity, they also work harder, LaBell noted.

Several years ago, MHT decided it wasn't enough to just say it would hire the handicapped if they applied. It set up a program to actively recruit and train handicapped people for DP jobs.

The program consists of a basic computer programming course and, upon successful completion of the course, placement in programing jobs at a remote site leased from the Human Resources Center on Long Island.

The center is especially equipped for the handicapped with ramps, extra wide doors and other special-need facilities. The remote site also enables the handicapped workers to avoid the difficulties imposed by daily travel into Manhattan. Currently MHT is employing three handicapped people at the center.

One of the objectives of the program is to keep working conditions as similar as possible to conditions found in any office or the working situation might prove defeating for the handicapped person, LaBelle noted. In keeping with this idea, the handicapped students take a basic programming course with only slight modifications.

The changes that do occur include adding larger boxes to coding sheets for those workers with manual handicaps and providing extra wide scanners and magnifying glasses to enlarge letters and numbers on computer printouts for those workers considered legally blind.

Terminal for Sightless

One MHT employee who is totally blind is learning to use a teminal developed for those without sight. Designed by Triformation Systems, Inc. of Stuart, Fla., the terminal allows blind operators to transmit data to and receive data from computers or other sources of coded information, according to the firm.

MHT is planning to purchase the interactive terminal, which converts information into braille at up to 120 char./sec and can print on paper tape or continuous-feed paper. Currently MHT's blind employee is learning how to use the terminal and is taking a special occupational training course at the University of Manitoba, which boasts a placement rate of 70% to 80% for graduates of the program.

Once the blind person has learned how to use the terminal, he can operate any of the four basic configurations made by Triformation without assistance, the company said.

If the machine runs out of paper, that fact will be communicated to the operator by a beeping sound. Errors in operation are communicated by devices on the keyboard which are automatically activated to indicate what the problem is and how to remedy it.

Blind programmers can obtain information in its original form from manuals that have been sound-recorded or from those published in braille. In order to get program specifications, someone must read them to the blind programmer, who copies them down in braille and then processes them.

Book Tells How To Reduce Costs

NEW YORK — *Data Procesing Cost Reduction and Control,* a newly published book by Dick H. Brandon, presents 119 techniques designed to reduce costs and improve profitability.

Designed for management, the book's content is keyed to three major audiences: the information systems manager interested in improving his budget, the senior management function to which the DP organization reports and the financial management function concerned with costs, budgets and audit responsibility.

Greater management involvement is stressed and the relationship between the user and the DP organization is examined to show where cost control can be exercised by both parties.

Other areas covered include people problems, the impact of organizational structure on costs and the effect of changes in the economy on DP activities.

The book is priced at $17.95 from Brandon Consulting Group, Inc. at 505 Park Ave., New York, N.Y. 10022.

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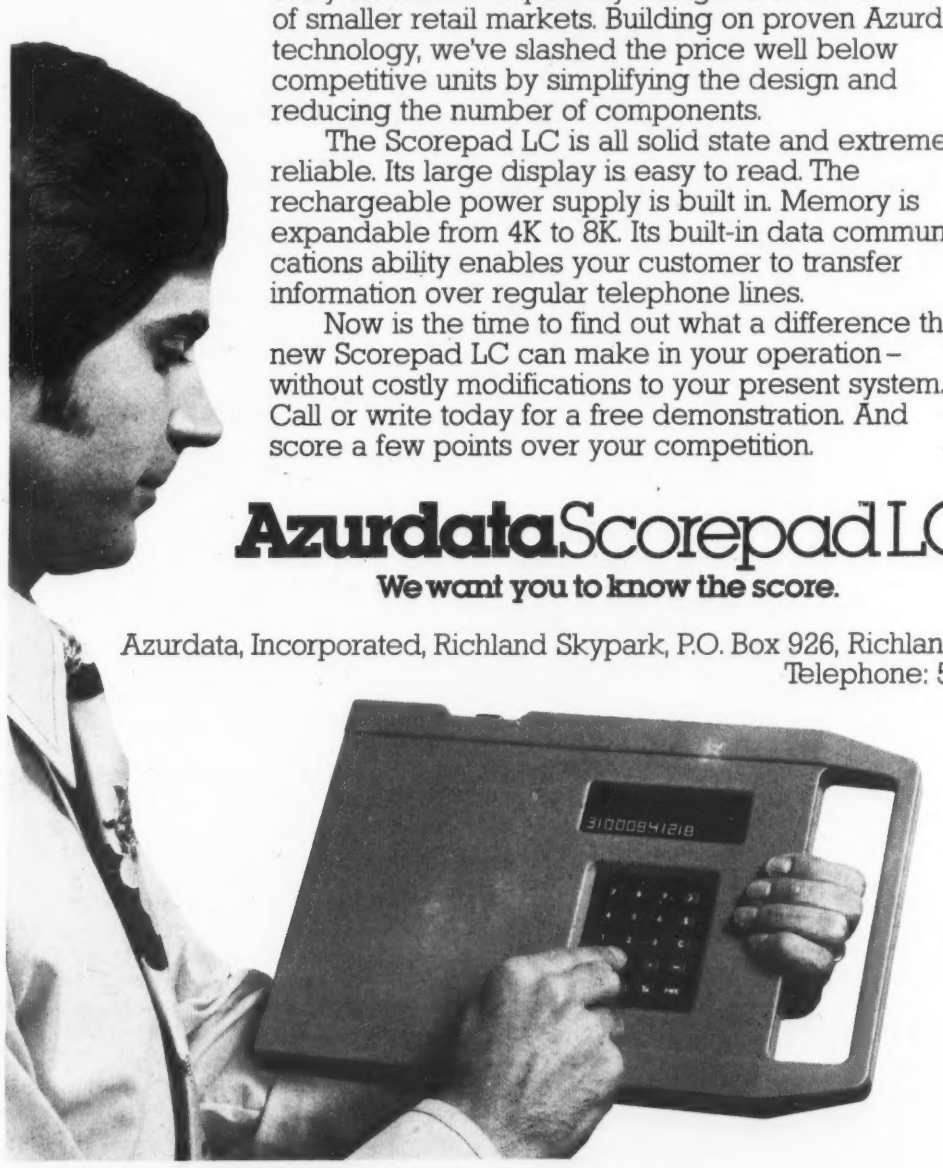

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User With Eight Sites Urges Simplicity in DDP Systems

By E. Drake Lundell Jr.
CW Staff

NEW YORK — In selecting and implementing distributed data processing (DDP) systems, users should try to avoid complexity, according to Michael P. Bouros, DP manager for J.W. Mays, Inc., which has established such a system in its eight department stores.

In addition, users should try to use packaged systems and software wherever possible, Bouros suggested at a recent conference here.

Bouros said one of the major reasons for going to a distributed system is to cut down on the complexity that would be involved in establishing an on-line system for the same application. With on-line systems, the user has to have a highly trained staff — which means a highly paid staff, he noted — and needs expertise in networking and data base management.

Furthermore, such networks usually require higher priced hardware and software, he said, and the hardware tends to be more specialized.

Another disadvantage of on-line systems is that if the computer center goes down, the entire network will fail, he pointed out. With DDP, failures are limited to particular installations and backup can be provided.

A system based on DDP can be more available than a centralized on-line system, he said, allowing users to do the processing at their convenience rather than at the convenience of the data center.

DDP systems can also be tailored more to individual user needs than massive centralized systems, he indicated, which have to be very general in nature.

Going DDP Route

Because of all this, Mays went the distributed route in all of its eight stores, he said, equipping each location with a Singer System Ten minicomputer that handles all the point-of-sale (POS) terminals in the store. These minicomputers are polled at night by the firm's IBM 370/145 at the central DP shop through the use of a Periphonics, Inc. front-end processor.

There are 40 to 100 POS terminals in each store; the system collects statistics on each sale at each terminal for master file updating.

In addition, individual store managers can use the system printer and a report writer package to get special reports on the activities within their operations. For example, the managers usually will get a printout of sales by department and store totals several times each day. Sales at a particular register can be accumulated so the manager can move extra personnel into areas where activity is concentrated.

Through these statistics on individual registers, managers can also identify their best operators and make sure they are assigned to registers where the demand is expected to be heavy.

At the central site, the information is accumulated and sales reports are delivered back to the minis in the store locations the next morning, he said, a process that formerly took several days.

Further, bad checks are identified in the central system and information on them is transmitted back to the individual stores, as is price change information and information on goods the store should expect to receive that day.

Even though Mays had some problems when Singer went out of business, Bouros still recommended buying packaged software from that equipment vendor or others if such packages are available. He said users should avoid doing too much programming themselves, even though a simple-to-use report writer would be a definite plus.

At the same time, however, he warned the attendees they should only consider software that is up and working and not count on software planned by the vendor for later availability.

Employer Warns No Test Can Measure Competency

By Howard Karten
CW Staff

NEW YORK — Competency must be distinguished from knowledge in assessing and hiring DP personnel — but, unfortunately, there is no test presently available to measure competency in programming and systems analysis.

This is one of the crucial facts to bear in mind when surveying the field of DP competence testing, according to Janis Miller, a second vice-president of Standard Security Life Insurance Co.

Speaking at a recent conference session on competency testing, Miller said she seeks three things in a job applicant: the knowledge to do the job, the ability to apply that knowledge to a solution and the ability to fit in psychologically in her shop.

If she feels unable to interview an applicant in a particular area, Miller said, she does not hesitate to call in someone more able to conduct that aspect of the interview. If necessary, Miller said, she will even engage the services of a psychologist for additional testing.

Miller, who holds the Certificate in Data Processing (CDP), stressed that the role of the CDP in entry-level jobs is negligible, although more companies are either requiring it or looking upon it favorably in applicants for mangerial positions.

However, she stressed repeatedly that a test is just a screening device and should not be used alone. Feeling comfortable with an applicant is highly important, she said, adding she sees some similarities between choosing a friend and choosing an employee.

Responding to a question on how to know whether an applicant has the knowledge to do the job, Miller said she never merely tries to fill a job. Instead, she said, she lists the skills she believes are required for successful performance of the job and then tries to match them with an applicant.

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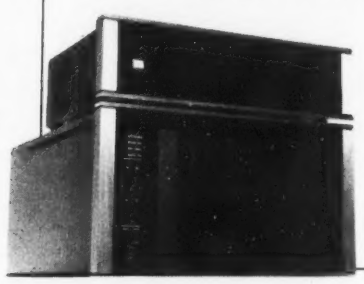
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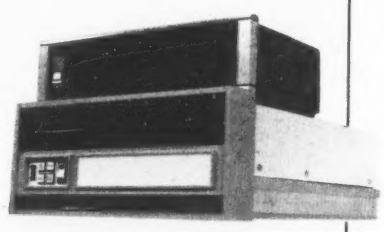

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Data Compiled on 46 Cities

Study Refutes Fluoride, Cancer Death Link

By Tim Scannell
CW Staff

ATLANTA — A community's cancer mortality rate cannot be related to the existence of cavity-preventing fluoride in that community's water supplies, according to the results of a computer-assisted study that appeared in a recent issue of the *New England Journal of Medicine*.

The results of that study, conducted by Dr. J. David Erickson during a two-year period, dispute the findings of a study published last year in which researchers demonstrated a direct correlation between the incidence of cancer-related deaths and fluoridated water.

The Erickson study, funded by the National Center for Disease Control here, centered on 46 U.S. cities, 24 of which used fluoridated water. The final statistics showed 195 annual cancer deaths for every 100,000 people in the fluoridated communities, but 197 annual cancer deaths per 100,000 people in the communities without fluoridation, Erickson said.

Computer Correlation

During the study, information extracted from computer tapes supplied by the U.S. National Center for Health Statistics was input to a computer that correlated similar characteristics of each selected city. The tapes consisted of data abstracted from death certificates and the characteristics included age, race, sex and place of residence at the time of death, Erickson stated.

Median education, population density, median income and the percentage of the work force employed in manufacturing (as a measure of industrialization) were also considered, he added, because "these four factors were subsequently shown to be correlated with the level of the cities' death rates."

The deaths were categorized by cause according to a modified version of the "34 Selected Causes" classification of the Center for Health Statistics. This classification includes all leading causes of adult deaths in the U.S. such as diabetes mellitus, cardiovascular or heart-related problems, motor vehicle accidents and malignant neoplasms or cancers, Erickson explained.

Mortality, Not Morbidity

Mortality was chosen as the outcome measure, Erickson said, because of the availability of death certificate information. Morbidity — the incidence of disease in a certain area — wasn't focused on in the study because the available data was unsuitable for scientific purposes.

For instance, although the National Cancer Survey provides figures on cancer incidence, these figures are taken from too large a survey area to be useful in determining the fluoride exposure of a certain state, Erickson said.

The computer used in the study was an IBM 370/158 with 6M bytes of main memory. The hardware, located at the Systems Development Branch of the center, includes 10 tape drives, two printers, two card readers and several disk drives with a total capacity of up to four billion characters of on-line storage.

Considering all of the variables, Erickson found the annual death rate from all causes in the cities using fluoridated water supplies was 1,123.9 for every 100,000 people, while the rate for those communities without fluoridated water was 1,137.1. Cities with nonfluoridated water systems actually had a slightly higher death rate than those cities using the chemical additive, Erickson noted.

Opposite Conclusion

In a similar study performed last year, John Yiamouyiannis and Dean Burk arrived at an opposite conclusion after examining the death rates in 20 U.S. cities. Their results found "the increase in cancer death rates in fluoridated cities is significantly higher . . . than in nonfluoridated cities."

However, Erickson contended the two researchers' control of the age, race and sex characteristics was, at best, "rudimentary."

"The cities that had fluoridated water were not really similar . . . to the cities without fluoridated water," Erickson said. "They were somehow picked because they had similar 'crude' cancer rates in 1950" and "those authors followed them through 1960 and then through 1970."

It was because of this previous report that the fact that there had been no large-scale general investigation of mortality statistics in the U.S. in relation to water fluoridation since the 1950s that Erickson decided to conduct his own examination of the available data. Other studies have also shown that children who drink fluoridated water have, on the average, experienced 65% fewer cavities.

The study also showed two cities, San Diego and Kansas City, both adopted fluoridation of their water systems and discontinued its use after a three-year period. Although Erickson couldn't recall exactly why these two cities decided to reverse their decision to fluoridate, he believes that ". . . somebody simply got up a petition and it was voted out.

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State Cited for Using DP to Deliver Services

By Marguerite Zientara
CW Staff

PIERRE, S.D. — The State of South Dakota was singled out in a recent federal report as a leader in the use of DP technology to improve the delivery of federally funded human services.

The state was cited for its work on a single-application-form system developed to determine eligibility of individuals for nine different federal human services programs.

As part of the Single-Purpose Application with Automated Referral System (Spaars) project within North and South Dakota, Montana, Wyoming, Utah and Colorado, the Integrated Eligibility Determination Unit (IEDU) in South Dakota has administered the nine human service programs since October 1977. These include Aid to Families with Dependent Children (AFDC); food stamps; Supplemental Security Income (SSI); Section 8 Housing Assistance; Title 20 programs, which include 24 services such as alcohol treatment and household services; the Comprehensive Employment and Training Act (Ceta) program, employment services, a local/state elderly tax rebate program; and a program unique to South Dakota — technically under Title 20 — which automatically tests for day care services if someone is ineligible for AFCD.

Spaars was called "the only meaningful attempt to develop a common taxonomy and uniform definitions for federally funded human services" by the Human Resources Team of the President's Automatic Data Processing Reorganization Project in a report issued in late April [CW, May 15].

Nevertheless, federal legal constraints prevent the total integration of the state's computerized system by limiting the information agencies can exchange with each other. These constraints limit the IEDU program to ascertaining "probable eligibility" rather than "true eligibility," according to Mary Evans, management analyst in the State Economic Opportunity Office. Evans is coordinating the Spaars program in the state.

"Verification information cannot be transferred between two agencies, so a client must go to two workers if he needs aid from both of those agencies," she said.

Under the IEDU system if someone goes into one of the three pilot locations in the state needing help, his probable eligibility can be immediately determined for all nine of the programs involved, according to Mike Pendo, president of Dakota Data Services of Rapids City, the time-sharing firm that furnishes the equipment for the program.

Eligibility Predicted

To determine probable eligibility, a series of 30 questions concerning the household and seven questions concerning each individual within the household is asked, Pendo explained. The system prompts the caseworker via CRT and, after the questions have been answered, predicts eligibility or noneligibility for the programs and specifies the reasons.

The system then asks if the client wants a referral. If the client does, the system generates the appropriate hard-copy forms, with the information that has been captured, to take to various agencies, Pendo said.

The questions asked each prospective client can be divided into three groups, according to Evans.

The first group includes identification information, such as the head of household, address and phone number. The second area is income information such as resources, benefits received, expenses and rent.

Third, the worker asks individual information on each member of the household, such as date of birth, grade level of a child, employment status and health status — whether someone is disabled, incapacitated or blind, for example.

The Social Security Number (SSN) is asked, but not as an identifier, Pendo noted, adding the system creates its own identification numbers. The SSN is used on the hard-copy forms generated; in compliance with privacy laws, after the generation of the hard copy the only information saved in the system is demographic information, Pendo said.

According to Evans, the SSN is asked "because the welfare programs wanted it." Under the Privacy Act of 1974, only federal welfare programs are allowed to require the SSN for eligibility.

The system runs on Dakota Data Services' Data General Corp. Nova 3D minicomputer with three Applied Digital Data Systems, Inc. Regent 100 CRTs and three Digital Equipment Corp. Decwriter printers, Pendo said. Two more CRTs will be added within two months.

Since the program hasn't yet compiled its final statistics on the operation, Evans said, it is "really too early to tell" how efficiently the system is working. "My guess is that it has increased the number of caseloads each worker can process, but we could not prove that at this point," she said.

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Eligibility Determined in 24 Hours

Single Form, Net Cut Payment Errors in Half

By Marguerite Zientara
CW Staff

MADISON, Wis. — A 50% reduction in overpayment and underpayment error rates has resulted from a computerized single-form eligibility prediction system for federal human services programs in four Wisconsin counties.

The Computer Reporting Network (CRN) collects the information necessary to predict eligibility or noneligibility for Food Stamps, Aid to Families With Dependent Children (AFDC), Medical Assistance and Supplemental Security Income (SSI), processing over 500,000 people per year, according to Bernard Stumbras, division administrator for Wisconsin's Division of Economic Assistance.

When an applicant enters a social service county office seeking aid, he fills out a 14-page application form asking such information as identification — name, address, telephone number, length of residence in Wisconsin; number of household members and information about each household member; health and medical information including insurance information; and employment information.

The application form also asks for a summary of the applicant's assets, benefits being received, household expenses and daily expenses such as lunch costs and child care expenses, according to Paul Pecorin, director of the State Office of Information Systems, which administers CRN.

CRT operators, with the aid of a prompting program, then enter the information into IBM Model 3270 terminals, of which there are seven within the four counties. The information is stored in the system's IBM 370/158 for night batch processing.

Reports are printed so that within 24 hours of an applicant's filling out a form, his eligibility for all four programs has been determined. "I've heard that some states are running 30 days," Pecorin remarked.

It is a one-stop process, Stumbras noted, in that an applicant fills out only one application form and deals with only one "case aide," or eligibility processing person, from beginning to end of the application process for the four human service programs. One of the objectives in the planning of the program was to reduce the number of times a client had to apply for certain services.

"Once an applicant went through the hassle of applying for one program, he wasn't ready to take on the hassle of the next program," Stumbras said.

"We looked at our caseloads and found we had high numbers of people eligible for and receiving Medical Assistance, for instance, but not receiving food stamps," he said. "That didn't seem to make much sense because the eligibility criteria for the two programs are almost identical."

Another objective of the program was for as much "horizontal equity" as possible, Stumbras said. "We knew that depending on what side of the bed the case aide got up on that day, how well the aide understood or was trained on the policies and depending on local variation on policy, people were sometimes unjustly found ineligible for benefits or the amount of their benefits varied," he said.

In addition, policies would often change three or four times a year, necessitating the examination of every record in the state to redetermine every participant's eligibility in every program, Stumbras noted.

According to Pecorin, "Our biggest benefit has been in the proper computation of eligibility. The eligibility requirement has been so complex that we were never sure whether in fact it was being calculated the same way by two different case workers."

Greater Productivity

Besides the error rate reduction, the system reduces case aides' work time on each case "by at least 22%," Stumbras said. Workers formerly completing two full cases per day on a manual basis have increased production to eight to 10 cases per day with automation.

"We heard repeatedly from case aides that, after they had started processing forms, they would find they still needed more information because the forms in the previous manual system obtained general information," Stumbras said. "Now, when the form is filled out completely, no matter what the situation, the data is there."

Design of the system began in September 1972. The first pilot county site went on-line in September 1976, and the most recent county site started operations in January 1978, according to Stumbras.

CRN is now in the process of converting to an IBM 3033 CPU using IBM 3790 intelligent terminals, expected to be in operation by the end of the year.

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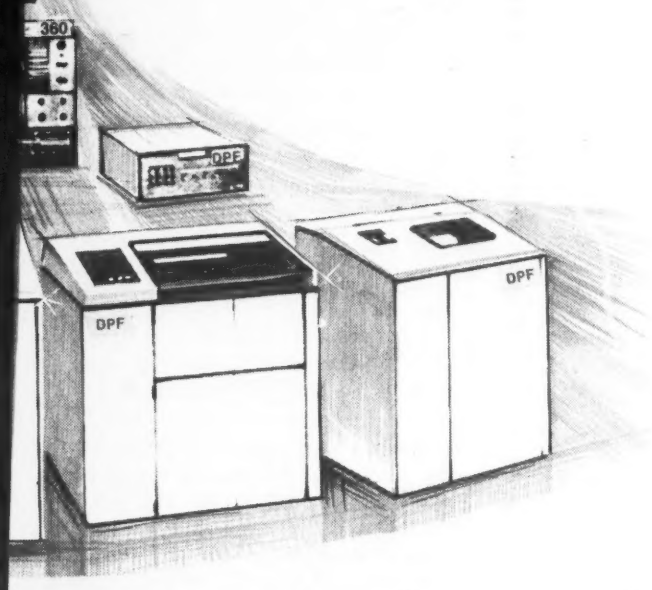

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Data Base Lists Information for Theater Buffs

By Marguerite Zientara
CW Staff

DALLAS — If you are curious about the state of the community theater in America today, the National Theater File (NTF) is the data base to access. NTF is maintained by Theater Sources, Inc., a nonprofit corporation created in 1975 to gather and distribute information about theater activities. It also sponsors a Theater Computer Users Group.

NTF contains three areas of information, according to Mike Firth, secretary of Theater Sources, Inc. The first area is a mailing list of about 2,000 theaters, each of which is coded by type of theater, such as community, children's or equity professional, Firth said.

Another area of information is specific data on about 300 theaters, gathered from returned questionnaires. It includes such information as staff size, the theater's season dates, size of the house and whether the group owns the theater or uses someone else's, Firth explained.

The program on which this information is run was designed so that the file can be expanded to contain up to 10,000 theaters of any type, Firth noted. "Our goal here is to keep the old data coded as to when it was valid so that someone can look at the state of the theater now," he said.

The third area of information in the file is a listing of more than 8,000 cities in the U.S. by Zip Code and population.

The NTF runs on Southern Methodist University's primary computer, a Control Data Corp. Cyber 76, on a time-sharing interactive basis, Firth said.

The data base is valuable for playwrights who want a list of the theaters in a particular area to contact about performing a new script, Firth pointed out, as well as to theater management students who want to determine various characteristics of audiences.

The Theater Computer Users Group provides a vehicle for information exchange via a newsletter "for people exploring uses of large and small computers in theater situations."

Topics of interest dealt with in the newsletter include special software programs for specific theater jobs such as set design and inventory, cutting lists and ticket sales, and special uses of hardware for things like stage lighting and management of production cuing, according to Firth.

Other theatrical uses of the computer include ticket sales, mailing lists and patron records, actor/casting lists, volunteer crew management, financial management records and a number of inventory and management functions, Firth noted.

Firth, who is a playwright as well as a computer programmer, said that if someone uses the information in the NTF for research, payment can be made in the form of more information for the file (as in questionnaire results). Information such as mailing lists can be purchased outright.

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Child Writes About DPers

By Eve R. Wirth
Special to CW

When you work with kids, you have a front-row seat to a stage of some rollicking, zany entertainment.

Consider this essay that a member of the grade-school set wrote for his teacher on the subject of people who work with computers:

A computer person has a top, middle and a bottom. The top starts off with a head which is most often attached to the neck. This is done eggspressly so it won't come flying off, and also it houses his brains to operate the computers. Next comes his roundish squared off shoulders which steadies his head smack in the middle.

Sometimes he shrugs his shoulders when he can't operate the computer real good, so then what does he do? Well, he makes a wrinkled-up nose face and his eyes get black-eyed and wild and they go in and out and this way and that way, and his lips go tight and thin and he yells out loud, "Hey you stupid computer. What's the matter with the input and output?"

A computer person also has a chest which goes in and out — it all depends if he feels proud or lousy.

He has a stomach part that has to be getting food three times a day and also coffee breaks like my pop has. But every once in a while specially when he gets real eggsighted on the job his stomach gets mad at him and starts to bubble-up, gurgle-up and he starts to feel gassy. So what does he do? He grabs a Rolaid from his pants and then burps a couple of times and that's the end of that.

He has legs and feet for traveling to work and all around the office when he has to use the computer. Sometimes these legs get tired, so he sits down, but not for too long or his boss will get wild and fire him, so he quickly gets up and walks around like.

A computer person is the most impotent person there is, because without him who would operate the computer?

Data Compiled in Emergency Rooms

System Monitors Consumer Products for Safety

By Tim Scannell
CW Staff

WASHINGTON, D.C. — All accidents, regardless of the degree of seriousness of the resulting injury, are potentially dangerous, according to the U.S. Consumer Product Safety Commission (CPSC). Unfortunately, maintaining an up-to-date record of such incidents and thus identifying "accident-producing" items is a problem because many people are often embarrassed to reveal the circumstances surrounding the accident.

The CPSC, in an effort to overcome victim hesitation, formed the National Electronic Injury Surveillance System (Neiss), a centralized computer facility that receives information from more than 119 statistically selected hospital emergency rooms across the country.

So far, the commission has used the system to report on injuries resulting from items ranging from bubble bath preparations and cosmetics to ice picks and coffee makers, a spokesman stated.

First Level: Surveillance

Neiss operates in a "bilevel" fashion, the spokesman noted. The first level, surveillance, involves recording such information as the day the patient was treated, the diagnosis of the injury, the bodily part affected, the type of product involved in the accident and the individual's age and sex.

Surveillance provides estimates of the frequency and severity of product-related injuries and establishes priorities for further study, the spokesman explained.

Information is input to two IBM 370/168 mainframes, located at the Parklawn Computer Center in Rockville, Md., via teletypewriters installed in the emergency rooms of participating hospitals. A hospital employee, trained by the commission, reviews all emergency patient records each day, isolating those "involving but not necessarily caused by" consumer products, the spokesman continued.

The who, what, where and when of the accident is typed into the terminal, creating a paper tape. The tape is then rewound and loaded onto a reader that is accessed, via telephone line, by the central computer.

The central computer compiles the information extracted from each of the teletypewriters and prepares reports that are reviewed by the commission's staff. The CPSC uses these reports to note the hazard patterns associated with the product involved and possibly develop remedial action or issue product-related warnings.

Second Level: Investigation

The second level of Neiss consists of in-depth investigations of accidents and interviews with both the victims and eyewitnesses. The investigations, sparked by the computer-produced reports, provide the evidence needed by the commission to initiate change or corrective action.

Products involved in mishaps are grouped into general categories such as "kitchen appliances," "sports and recreational equipment" and "housewares," each assigned a coded "product number." The actual number of reported accidents treated at hospital emergency rooms is inflated to produce an estimated number of product-related accidents that occur in the continental U.S.

The estimates, because they are derived from a sampling rather than a complete emergency room census, are subject to error, the spokesman pointed out.

The system is also subject to inaccuracy because injuries treated at a doctor's office, through direct hospital admission and at home are not reported, he added.

Injuries are broken down into specific categories and assigned a "mean severity value." This measure is used to compare severity of injury among different products, the spokesman said.

Misleading Data

The computerized system, which catalogs more than 400,000 emergency treatments involving nearly 1,000 products each year, can sometimes provide misleading data, the spokesman admitted. For instance, Neiss data was used by commission staffers to prepare a report that showed a phenomenal increase in skateboard-related injuries.

The computer showed occurences of this particular type of injury soared from 3,230 in 1974 to 27,522 in 1975 to 71,483 in 1976. After investigating the data and analyzing the injuries, however, the CPSC discovered skateboards were essentially safe, but found the people using them were doing so in a reckless manner.

While the system does list the products involved, the spokesman stated, the injury does not always have a direct cause-and-effect relationship with the product.

For example, an injury that involved a toybox actually occurred when the victim tied a jump rope to an overhead pipe in the basement to swing over carpeted stair steps. The rope broke and the victim fell, striking his head on the corner of the toy chest, the spokesman recalled.

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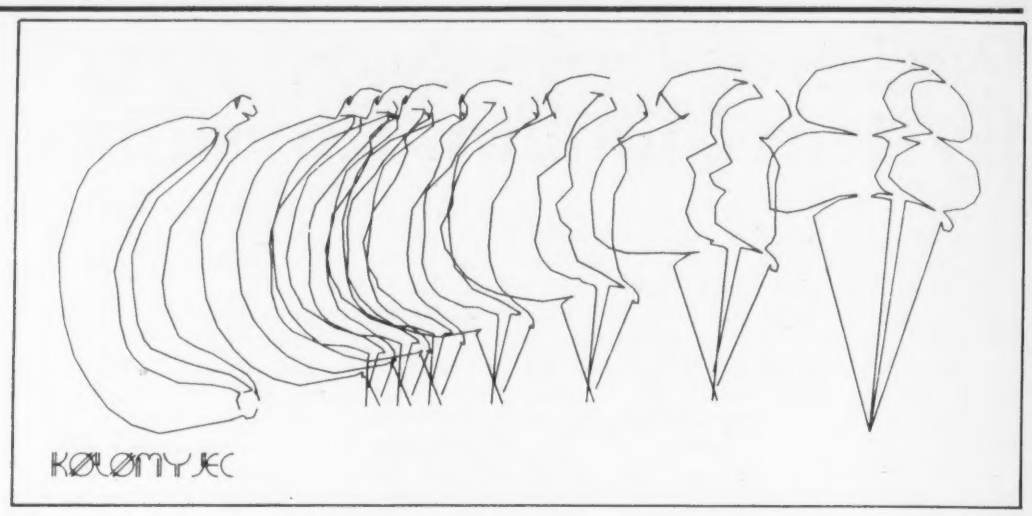
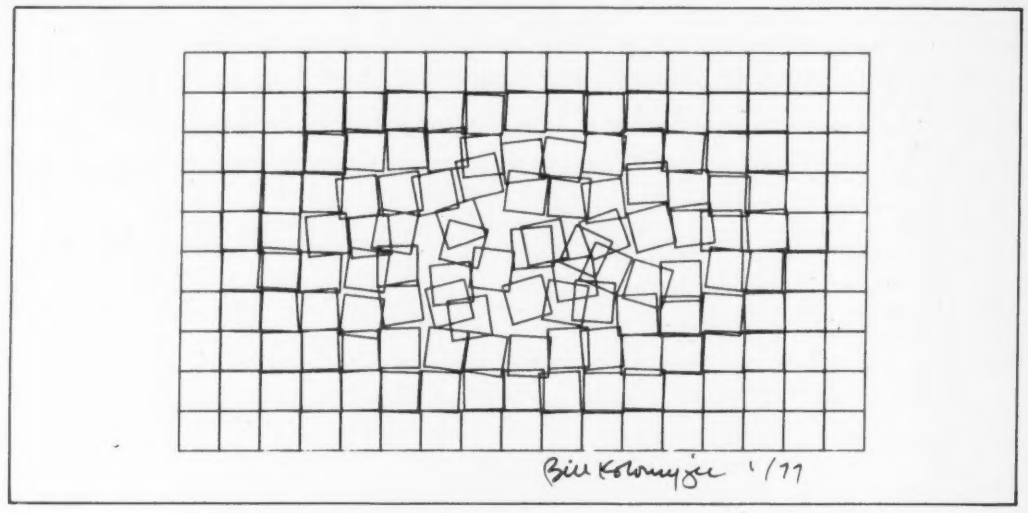




Concept behind 'shotgun' art approaches 1940s abstract expressionism

By Marguerite Zientara
CW Staff

LANSING, Mich. — "I'd rather do computer art than anything else, but I have to make a living so I teach here at the university." These are the words of William J. Kolomyjec, a man who, for about 10 years, has been using computer equipment to produce art such as that shown here.

Kolomyjec's interest in computer graphics began while he was an undergraduate working toward his Bachelor of Fine Arts degree in industrial design at Michigan State University. He now teaches engineering graphics and computer graphics in the university's College of Engineering. He heard that one could use the computer as a design tool and "just started checking it out."

Over a period of a couple of years, he taught himself to program, and further research culminated in a Master of Fine Arts degree in graphic design in 1975. Since the majority of his work was in computer graphics, Kolomyjec became the first "computer graphic artist" to graduate from Michigan State.

Kolomyjec considers himself a pioneer of the medium. "Traditional artists are scared to death by the technology involved and most people are appalled by the idea of using the computer for art work. They think the computer does all the image-making. Go ahead and program a computer to draw a bird — it won't know what to do until you describe the bird to it," he said.

Computer vs. Brush

"I use the computer as a traditional artist would use a brush — as a tool to produce the artwork. I have complete control," Kolomyjec explained, adding, "The nice thing about my medium — and there are two ways to look at it — is that I can turn trivial decisions over to the computer, such as using the random number function."

A single image-generating program utilizing random parameters can produce infinite variations in the sense that duplication might actually occur but only after a few billion trials, he pointed out. Therefore, each work can indeed be unique and yet remarkably similar to a previous work or to the thousandth piece to be produced by output equipment. This capability, according to Kolomyjec, is forcing us to reevaluate the concept of "originality."

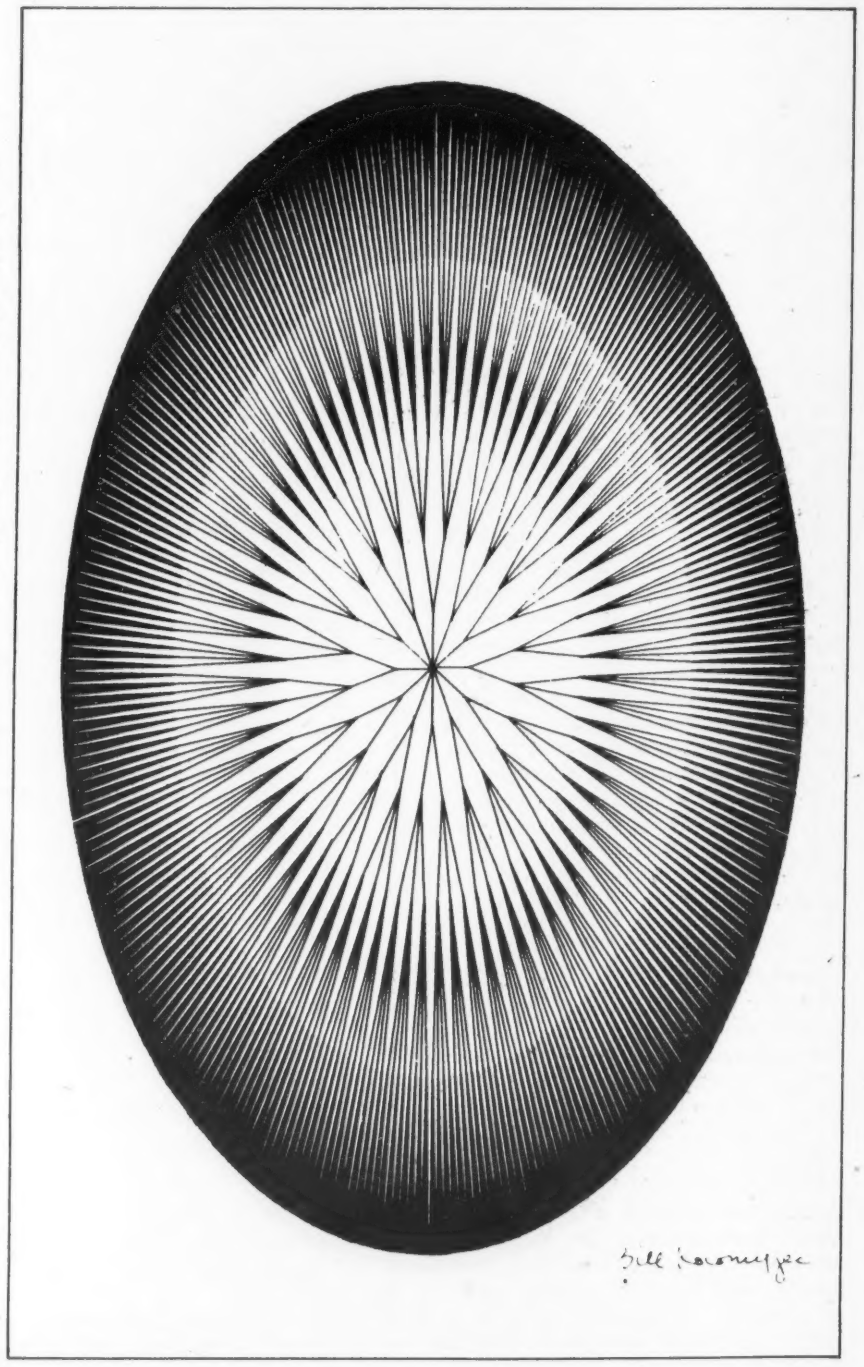
In addition, he said, the random technique enables the artist-programmer to "define a percentage of involvement within a computer-produced image." This allows the artist to become detached, wholly or in part, from the execution of a piece.

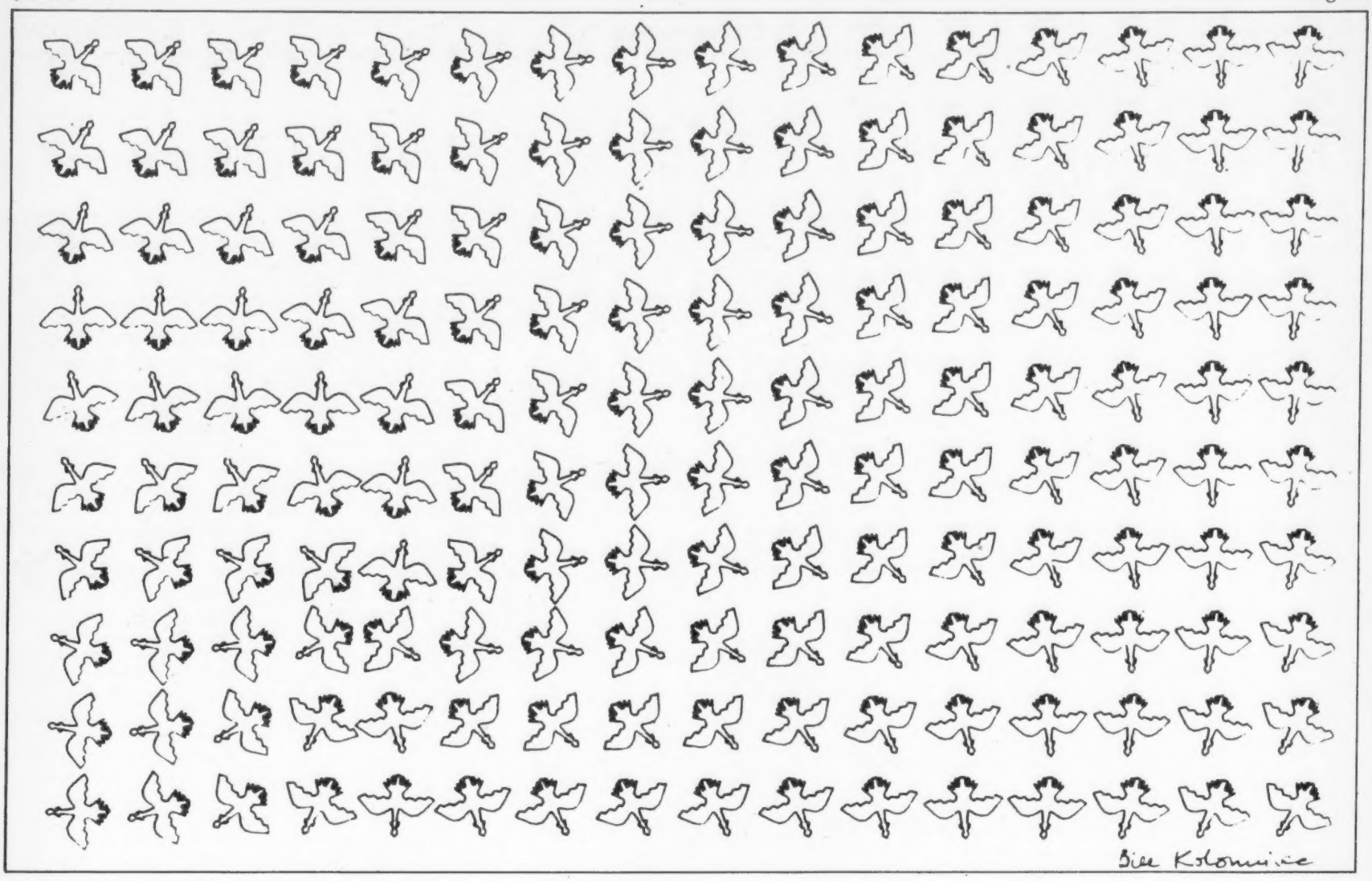
"It can be considered 'shotgun art,' in which you load the gun and fire it, so to speak," he said. That process is very close to the thinking involved in the Abstract Expressionism of the 1940s, in which the underlying concept was to minimize control, "to let the subconscious roam as it would." This allows for accidental occurrences with frequent random and chance effects, Kolomyjec said.

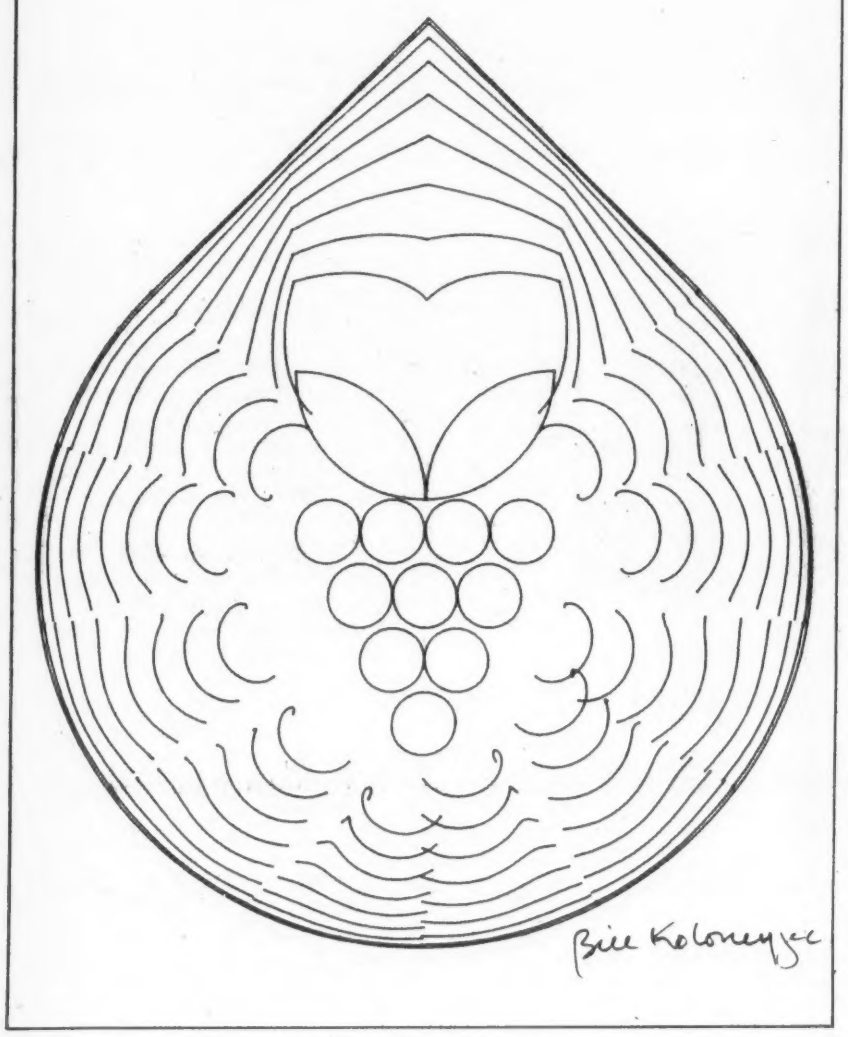
Two Methods Used

To produce his images, Kolomyjec uses either of two systems belonging to Michigan State University. One consists of a Control Data Corp. 6500 computer and a Calcomp 936 plotter; the other is an IBM 1800 running a Calcomp Series 500 plotter. Since Fortran is the language of this equipment, Kolomyjec uses that for his programs.

The artists uses two programming methods. The first is the "digitized image," which is provided to the computer external to a computer program. "I draw the image on a piece of graph paper using a series of dots and the







Shown clockwise from top left: "Banana-Cone" (Fig. 1), "Geese" (Fig. 2), "Water Into Wine" (Fig. 3), "Kolomyjec's Moire" (Fig. 4) and "Boxes I" (Fig. 5).

computer draws the lines between the dots. Since the computer can't draw a curved line, it's really a series of straight lines that make up the image," he explained. "Once the image is drawn and debugged, then I develop a program to manipulate that image by rotation or scaling."

The second method is by means of algorithms, or internally as part of the computer, Kolomyjec noted. The random number generator falls within this category, he said.

In "Banana-Cone" (Fig. 1), the key images of the banana and the ice cream cone had to be digitized, he said. "Each image has 99 digitized coordinate locations and appropriate pen controls for lifting the pen at proper line segments," he added.

"As bananas can be made into ice cream to be consumed as food, it is possible to change the form of a banana using linear interpolation into that of an ice cream cone which may be visually consumed again and again," Kolomyjec said.

In linear interpolation if two figures are placed a certain distance apart, one can map the intervals between them, along a straight line, Kolomyjec explained. Two figures should have the same number of points, he said, so that if one draws a line between the same number of points and takes the midpoint of all those lines, then connect the midpoints the same way the other two figures are connected, the result will be an interpolated figure.

Excels at Repetition

The work "Geese" (Fig. 2) is another example of using a data base of imagery external to a computer program. "This is an excellent example of one of the things the computer does so well — that is, repetition. This program uses the same data over and over again with slight modifications," he said. "I'd go crazy drawing all those birds."

Although "Geese" can be likened to Andy Warhol's repeated soup cans, coke bottles or dollar bills, "I do not attempt to bring myself down to the level of the machine as Warhol does, but rather try to bring the machine up to my level," he said. "I use more than just its ability to do repetitious operations; I also create a dynamic structure."

Another example of linear interpolation is "Water Into Wine" (Fig. 3) Interpolation was used to go from parts of the symbol for wine (grape cluster) to the periphery of the water drop. "I can change anything to anything," Kolomyjec said.

"Kolomyjec's Moire" (Fig. 4) was created using an algorithm. "I just took 12 lines that crossed. At the end of the lines, I split them into two, at the end of the next line into three, then four and then five," he said. Therefore, the periphery is made up of 1,440 points on a circle.

"Boxes I" (Fig. 5) is based on a classic computer work entitled "Gravel Stones" done by George Nees, a German computer graphic artist. "The idea is that the closer the boxes get to the center, the more they're allowed to vary and rotate," Kolomyjec said.

"I have the opposite, too, in which the closer the boxes get to the sides, the more variance is allowed. I think that says something about people in a strange sort of way — those loose on the outside and tight on the inside as opposed to those loose on the inside and tight on the outside," he added.

"I consider this a very high form of art," Kolomyjec said. "I'm using a highly technical objective medium to do something very subjective. You don't see my programs — the rubble that I struggle with. I'd put my images up against anybody's images in terms of art."

On Sale: Overalls to CPUs

DP Mailings Offer Entree to GSA Auctions

By Tim Scannell
CW Staff

BOSTON — Rubberized overalls, oil drums and mock-ups of Saturn booster rockets have little in common — except that, at one time or another, they have been auctioned off to the public by the U.S. General Services Administration (GSA).

Twice a month, each of the GSA's 10 sales branches holds an auction to help eliminate the surplus materials and objects accumulated by various government agencies. When an agency declares an excess, it notifies the GSA which, in turn, alerts other agencies that certain articles are available.

"If an agency wants a product, the GSA turns it over to that agency; if no other agency needs it, then we put it on the market for public sale," according to Joe Lawless, regional director of business affairs for the New England area.

Bidding for most of the items offered for sale is done through the mail by people whose names are maintained on a computerized mailing list. Because of the variety of items, a computer is used to match specific items with the people who are interested in purchasing them, Lawless said.

When office furniture is up for sale, only those interested in this type of furniture are notified, for example.

The mailing list is updated on a weekly basis by the Centralized Mailing Service Branch in Denver, Colo. Data is input from the GSA's regional branches around the country in batch mode and then processed using a General Electric Co. 425 CPU, a spokesman said.

The Mailing Lists Branch also handles the compilation duties for other agencies such as the Environmental Protection Agency and the Civil Service Commission.

The key to taking advantage of the used items offered by the GSA is getting placed on the mailing list. "A firm or a private citizen wanting to get on the mailing list simply completes an application and sends it into the local bureau," Lawless explained. There is a different mailing list for each of the 10 regions across the country.

A prospective bidder, when filling out an application, must indicate what items he is interested in purchasing and from what state, Lawless said. The state is important because a successful bidder has to pay for and pickup his purchase immediately.

There is a 15-day "grace" period for those people who can't pickup their items; after that the object becomes the property of the government again.

A person who reneges on his agreement to accept an item must pay 20% of the item's cost or the GSA will remove his name from the mailing list, Lawless said.

Three Techniques

There are three types of auctions staged by the GSA. The first consists of people submitting "spot bids" — individuals inspect an item offered for sale — usually a piece of heavy equipment or a vehicle, fill out a card and place it in a box in front of the item being sold.

"The auctioneer then opens the box and reads the prices off to determine the highest bidder," Lawless said.

The second type of auction, based on sealed bids, involves people sending in price offers through the mail on items they have learned about via GSA bulletins.

The third type of selling technique is the traditional auction, whereby the items are presented to a group of potential buyers and the floor is opened up for bidding. Usually, this type of auction attracts a gathering of about 800 people, Lawless said.

"There's a lot of worthwhile material that the general public can pick up at a reasonable price," he continued. Occasionally, a few Cadillacs and foreign-made cars have found their way into the bidding platform after having been confiscated "because the person who owned the car was using it to transport drugs or weapons. At one time or another, there have even been a few computers added to the selling list," Lawless said.

"On the bidding document we tell what we know about a product — whether repairs are required or if the product is junk or scrap," he noted.

So far, the GSA has managed to sell every item that it has offered for sale. This includes 3,500 coat hangers recently sold by the New England region and cattle from the Lyndon B. Johnson ranch auctioned off by the Southwest bureau, Lawless said.

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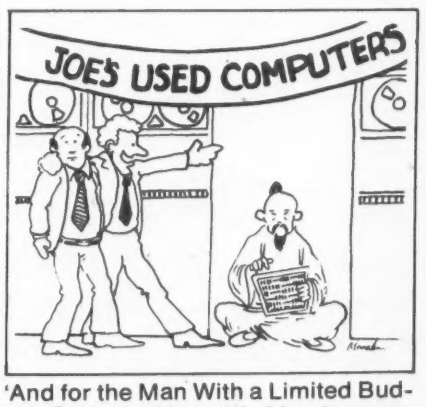

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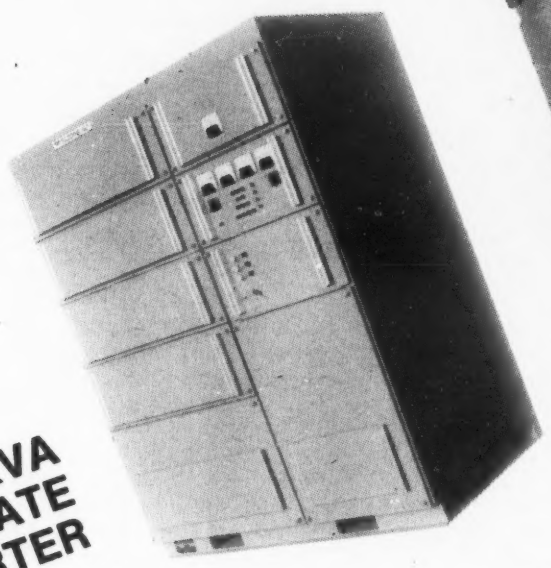

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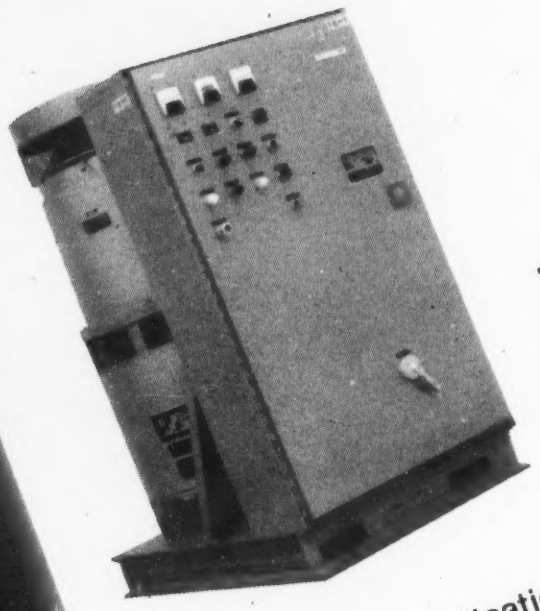

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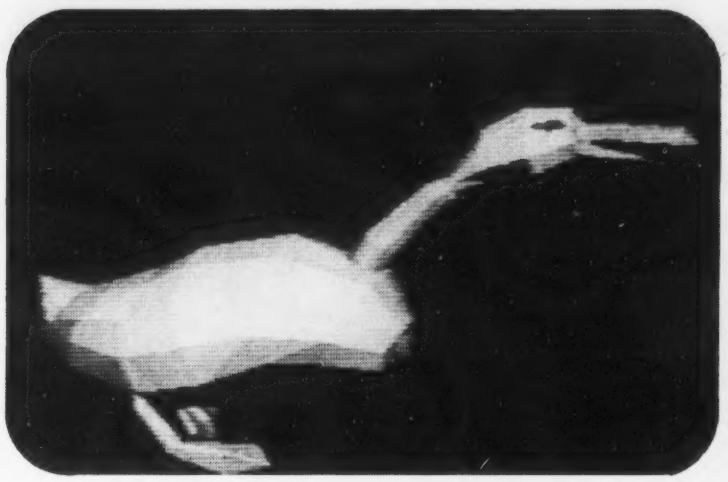
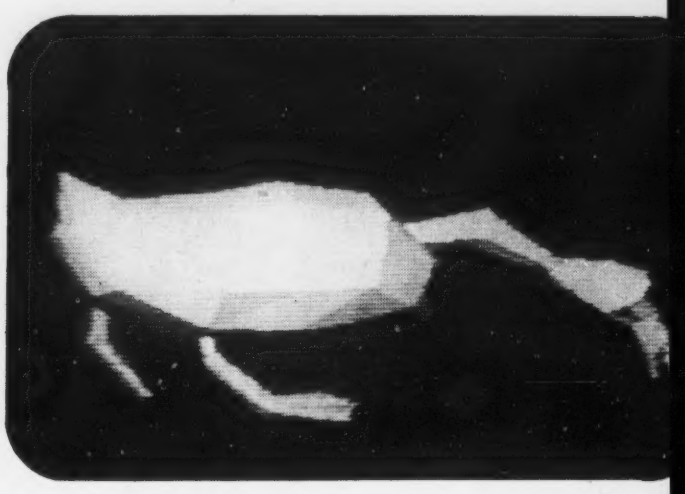




'The duck walked through the flowers.'

To Teach Deaf Children

Artist Makes Sentences Come Alive

By Marcia Blumenthal
CW Staff

COLUMBUS, Ohio — An Ohio artist and computer scientist has teamed up with a researcher at Gallaudet College in Washington, D.C., to teach deaf children language skills through the use of computer-generated animation.

According to artist Charles Csuri, the system used is basically a digital computer interfaced to a standard color television set. The animated presentation is distributed via TV or video tape.

The teaching method is aimed at helping deaf children between the ages of 10 and 13 understand the grammatical function of prepositions, particulary in reading and writing. This is a problem that does not come up in sign language because that language is basically conceptual, according to Dr. Margaret Withrow, a researcher at Gallaudet College.

The teaching materials are generated in three basic steps. The first is data generation, which is essentially a method of synthesizing three-dimensional objects or "creatures" into the central processor of a minicomputer. Csuri uses a Digital Equipment Corp. PDP-11/45.

Next comes the animation language, which Csuri described as a script directing the machine to make the objects perform in a particular manner.

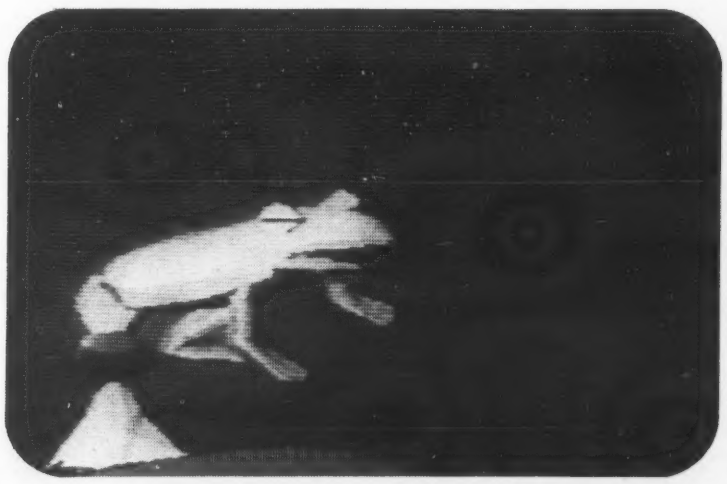
The third part consists of display and real-time playback. Television images move at the rate of 30 frame/-sec, however, and the minicomputer is too slow to produce representations of three-dimensional colored, shaded scenes in the amount of time, Csuri explained.

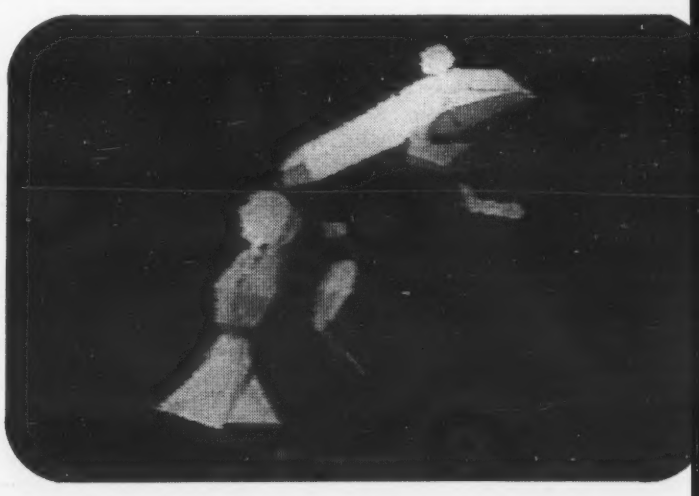
Since it takes the computer several seconds to produce each frame, the frames are produced and then stored in an encoded format on disk. Once all the pictures are finished, they can be played back in real time through the computer on a standard color TV set. The output also can be recorded on a video tape cassette, he explained, adding that the system enables the animators to edit under computer control.

Animated Sentences

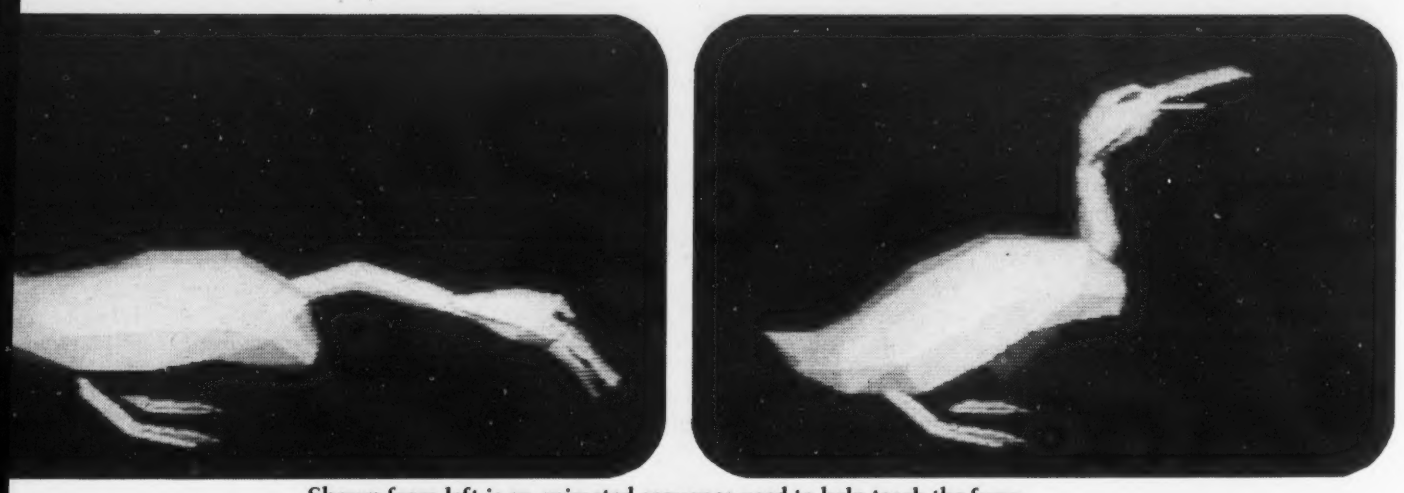
Csuri's system creates animated pictures and sentences, which can be displayed together or individually or with the prepositional phrase standing alone.

For instance, to teach the sentence "The duck walked through the flowers," the computer animates the scene which is displayed on the TV or video tape player. Then





'The frog jumped over the rock.'



Shown from left is an animated sequence used to help teach the function of prepositions to deaf children. Individual words are superimposed on the screen and grow larger and smaller along the y axis as stressed in the sentence.

the sentence appears on the screen. As the student reads the sentence, individual words become animated, growing larger and smaller along the y axis as they are stressed in the course of reading.

The deaf child can see the interaction of pictures and text. A programmed teaching device also can be hooked up to a video player that requires the child to respond to a question designed to test understanding of prepositional phrasing.

The animation project has been financed through a grant from the Department of Health, Education and Welfare's Bureau of the Handicapped, according to Csuri.

The system is limited in some respects, he said, because it is not interactive. However, Csuri noted that a group at the National Institute for the Deaf in Rochester, N.Y., has developed an interactive learning system, now in the experimental stage, that uses a microcomputer.

Although the animated system is limited, Csuri pointed to its advantages. The system is many times less expensive than animated films and only requires one person to generate the entire animation, whereas film requires the combined effort of several specialists.

Art, DP Background

No dabbler in computer art, Csuri began his career as a painter and switched to the computer 12 years ago. One of his early computer animation films is part of the collection of the Museum of Modern Art in New York City.

As an undergraduate at Ohio State University in Columbus, he took several science courses and, during the early 60s, he became fascinated with the computer graphics developments.

In fact, Csuri recalled that his early art work had a scientific flavor, involving systems, random number generators and the development of a drawing machine.

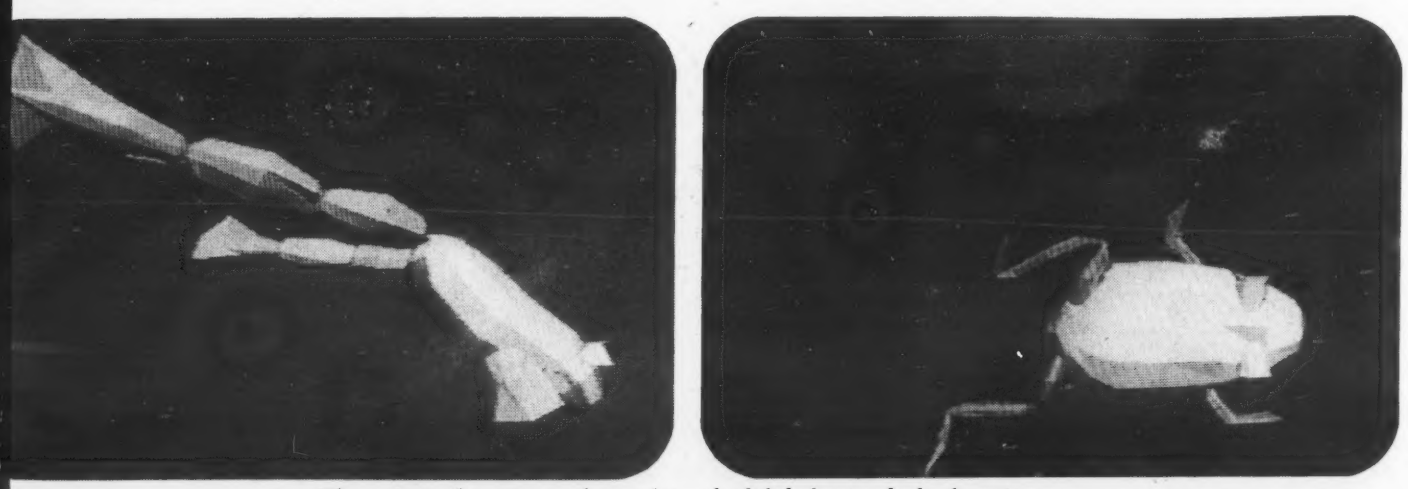
Csuri, who holds a joint appointment in computer science and art education at Ohio State, designed the system called "Anima II" as a general-purpose computer animation system. The work was done over a three-year period with a grant from the National Science Foundation.

Withrow, having heard about the system, contacted Csuri to see if the system could be adapted to teach deaf children language skills.

Presently, in addition to his work with Gallaudet College, Csuri is a member of Ohio State's Computer Graphics Research Group. This group consists of six full-time associates and several graduate students working part-time.

Aside from the computer animation system, the group is developing computer-synthesized images of highly complex scenes. They have created software which generates images with 500,000 to one million edges in a relatively short time.

In addition to the DEC PDP-11/45, the group uses a Vector General Inc. display and a Digitech Data Industries, Inc. color display. A 32K-byte DEC VAX-11/780 is on order.



The animated sequence shown from the left helps teach the function of the preposition "over." The concept of prepositions is difficult for deaf children because prepositions are not used in sign language.

Calendar

June 20, Dover, N.J. — **Role/Meaning/Significance of Auditing Automated Information**, sponsored by the Federal Information Processing Council Region No. 2. Contact: Peter C. Daikos, P.O. Box 902, New York, N.Y. 10008.

June 28-30, Amsterdam, The Netherlands — **European Datamanager User Group** (EUDG) Conference. Contact: Suzie Wilson, EUDG, 71 Gloucester Place, London, W1H 3PF, England.

July 6-7, Washington, D.C. — **Software: How to Buy It,** sponsored by Datapro Research Corp. Contact: Don Welsher, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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July 10-12, Washington, D.C. — **Computer Performance Measurement: Tools and Techniques for Increased System Productivity**, sponsored by Datapro Research Corp. Contact: Don Welsher, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

July 10-12, Los Angeles — **Effective Computer Operations Management**, sponsored by Datapro Research Corp. Contact: Don Welsher, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

July 10-12, New York — **Microfilm in Records Management**, sponsored by American Management Associations (AMA). Contact: AMA, 125 W. 50th St., New York, N.Y. 10020.

July 10-13, New York — **Forms Design Course**, sponsored by American Management Associations (AMA). Contact: AMA, 135 W. 50th St., New York, N.Y. 10020.

July 10-21, Santa Cruz, Calif. — **Principles of Data Base Management Systems**, sponsored by the University of California Extension. Contact: Joleen Kelsey, University of California Extension, Santa Cruz, Calif. 95064.

July 10-21, Santa Cruz, Calif. — **Programming Methodology**, sponsored by the University of California Extension, Santa Cruz, Calif. 95064.

July 12-14, Chicago — **DP Project Management: A Practical Approach**, sponsored by Datapro Research Corp. Contact: Don Welsher, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

July 12-14, Washington, D.C. — **Data Communications: Effective Network Design**, sponsored by Datapro Research Corp. Contact: Don Welsher, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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July 15-18, Boston — **Expo '79**, sponsored by the Optical Character Recognition Users Association (OCRUA). Contact: OCRUA, 10 Banta Place, Hackensack, N.J. 07601.

July 17-19, Boston — **Matrix Management**, sponsored by the Wharton School, University of Pennsylvania. Contact: The Wharton School, University of Pennsylvania, Dietrich Hall, Locust Walk, Philadelphia, Pa. 19174.

July 18-20, Washington, D.C. — **Microcomputers: Principles and Applications**, sponsored by American University. Contact: Barbara Sumney, American University Office of Summer Sessions and Special Sessions, Massachusetts and Nebraska Ave. N.W., Washington, D.C. 20016.

July 19-21, San Francisco — **Data Communications: An Introduction to Concepts and Systems**, sponsored by Datapro Research Corp. Contact: Don Welsher, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

July 19-21, Washington, D.C. — **Minicomputers and Distributed Processing**, sponsored by the University of Chicago. Contact: University of Chicago, Center for Continuing Education, 1307 E. 60th St., Chicago, Ill. 60637.

July 23-28, Cambridge, Mass. — **Harvard Computer Graphics Week**, sponsored by Harvard University Laboratory for Computer Graphics and Spatial Analysis. Contact: Laboratory for Computer Graphics, Harvard University, 48 Quincy St., Cambridge, Mass. 02138.

July 24-26, Newport Beach, Calif. — **1978 Summer Computer Simulation Conference** (SCSC), sponsored by the Society for Computer Simulation. Contact: Dr. Ralph C. Huntsinger, 1978 SCSC Program Chairman, Computer Science Department, California State University, Chico, Calif. 95929.

July 24-28, Santa Cruz — **Design and Analysis of Algorithms**, sponsored by the University of California Extension. Contact: Joleen Kelsey, University of California Extension, Santa Cruz, Calif. 95064.

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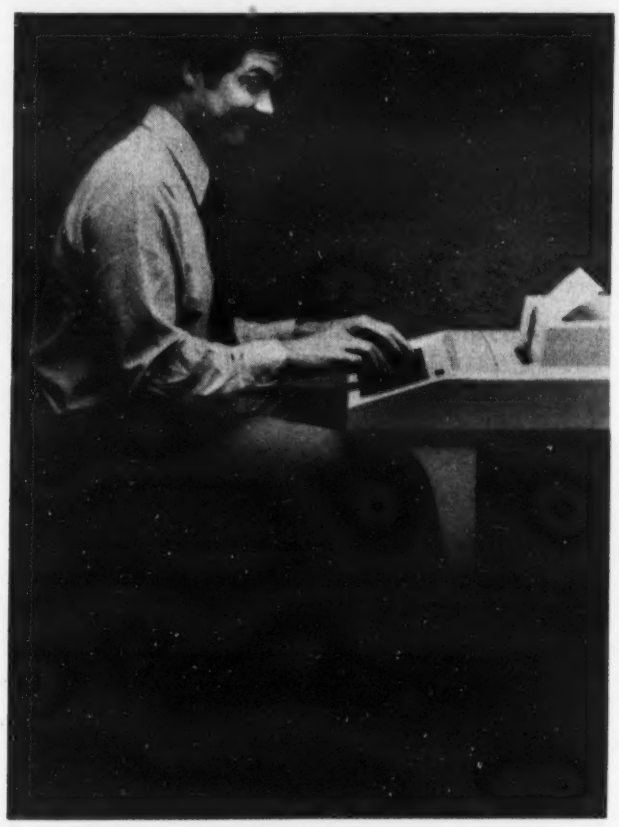

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Bankers Probing Costs of Privacy Proposals

WASHINGTON, D.C. — The American Bankers Association (ABA) has undertaken a research project to determine how much the recommendations put forth recently by the Privacy Protection Study Commision will cost the banking industry.

The commission was an independent government-appointed group set up by Congress and the White House to recommend privacy measures in the private sector.

Under contract, Touche Ross & Co., an independent accounting firm, began the study in late April and expects to finish in September.

The purpose of the privacy commission's recommendations is to ensure that financial institutions maintain limited and accurate personal information files and that only customers be allowed easy access to their files, with the exception of legitimate credit agencies and law enforcement agencies.

The privacy commission recommended, for example, that federal law be enacted to provide a depository institution or credit grantor "must notify an individual with whom it has or proposes to have a depository relationship of the uses and disclosures which are expected to be made of the types of information it collects or maintains about him; and that with respect to routine disclosures to third parties which are necessary for servicing the [depository or credit] relationship, the notification must include the specific types of information to be disclosed and the types of recipients."

The commission also recommended that data concerning such an individual "must be treated as confidential" by the depository institution or credit grantor and that disclosures to parties other than those necessary to service the financial relationship "must be specifically directed or authorized by the individual."

Although such information as income, indebtedness and personal financial activity "have not been given out for 200 years," according to ABA spokesman William Moroney, the fear exists that with the information more easily retrievable on computer systems, banks might start selling this information.

House Bill 8281, amending the Fair Credit Reporting Act and containing the commission's recommendations, was introduced last year. The ABA spokesman said action on the bill is not expected until fall, by which time the Touche Ross study is expected to be completed.

"If the study shows that implementing the bill's recommendations will cost the banking industry, for example, 10% more to operate, that could influence a number of congressmen in amending a number of recommendations," according to Frank Curran, ABA director of retail banking services. "If it is costly to the industry, eventually it will be costly to the consumer."

In the course of the study, Touche Ross will visit approximately two dozen banks, spending "a considerable amount of time" in each one. The banks will be representative of the entire industry in terms of the way they operate and the kinds of credit business they are in, Curran said.

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Potential Joiners Invited to Meet With EFT Group

SAN FRANCISCO — The Electronic Funds Transfer (EFT) Association will hold a special meeting here June 12 for prospective members.

The program will include briefings by Harold Mortimer, general counsel of First National State Bancorp. of New Jersey, on "Legislative and Regulatory Proposals Affecting EFT"; by Roland Brandel of Morrison and Foerster, San Francisco, on "EFT and the Uniform Commercial Code" and by Edward H. Coughran, director of the Universtiy of California at San Diego Computer Center, on "EFT and Computer Abuse."

Reservations for the meeting can be made by contacting the EFT Association at Suite 505, 1620 Eye St. N.W., Washington, D.C. 20007.

The EFT Association was formed in 1977 to support continued development and implementation of EFT systems and services.

To Minimize Service Loss

Canadian Carrier Group Sets Up Disaster Plan

By Ann Dooley
CW Staff

OTTAWA — The Canadian Telecommunications Carriers Association (CTCA) has established a disaster plan aimed at continuing service in case of an emergency, restoring service to essential users and protecting vital points in the network.

The plan will put a high priority on restoring and servicing those DP installations that are essential to the health or protection of citizens. Commercial DP installations will be given a lower priority, but will benefit from the faster, more coordinated response to a disaster situation, CTCA officials said.

Previously, industry members had individual disaster plans which varied in their effectiveness and thoroughness, according to Herb Whittick, chairman of the CTCA Emergency Operations Planning Committee. Realizing the importance of a single, efficient plan, the industry planned the program in conjunction with the Canadian government to ensure a comprehensive approach.

Line Load Control

One practice being implemented under the new program is line load control, which is intended to guarantee easy access to essential users. Previously, no consistent system existed to identify telephone numbers which need uninterrupted service during an emergency.

Line overloads may occur whenever unusual service demands prevail, such as during a disaster or during severe weather conditions. In these situations, CTCA has determined it essential that sufficient service should be provided to hospitals, police, fire departments and other important services, according to Whittick.

The line load control system was developed to safeguard phone service to those essential users when the total volume of calls exceeds the design limits of the switching equipment. The system allows only a certain number of calls to originate from nonessential lines to assure continued operation of the essential lines left in service. The ability to receive calls is still available to all subscribers under the system, Whittick noted.

Each carrier will determine as a consequence of economics and technological considerations which switching offices should be equipped with line load capabilities. Capital requirements implementation and ongoing maintenance costs of the line load control system will vary according to local needs, but each company can obtain funds from the appropriate government agency, in order to pay these costs, Whittick said.

Vital Points Guidelines

Previously, all the CTCA members had various guidelines identifying vital points in the telecommunications networks, but now all the members are cooperating to set up a common list.

A "vital point" is a location which, if removed, would affect the ability of a telecommunications network to meet nationwide service requirements, Whittick explained.

The vital points program is intended to uniformly identify vital points, some of which may be DP sites, define the level of protection the carriers are willing to pay and serve as a guiding document for the industry and government agencies. Members of CTCA annually examine and categorize vital point locations as well as protect vital points against vandalism and trespass.

Security protection in case of war, civil insurrection or riot will be provided according to preplanned strategies devised by individual CTCA members and the appropriate government body, according to Whittick.

CTCA members will also plan their networks with regard to the communication facilities' ability to survive. This will be a fundamental consideration in planning, operating and controlling the networks, Whittick said.

Although CTCA members have always responded quickly in past emergency situations, the group decided to create specialized telecommunications equipment exclusively for such emergencies, Whittick noted. The CTCA, in cooperation with the Canadian government, plans to determine possible emergency needs, develop packages and plan the deployment, including transport and methods of sharing equipment use, he said.

In addition, plans are being drawn up to handle emergency requests for telecommunications services. Charges for the program will be paid by the government while the ownership and control will remain with the member company.

Since speed is essential in such a situation, member companies will provide a universal telephone number answerable 24 hours a day at one location within each province and territory.

The CTCA has already devised a portable telecommunications package that can be taken into an area in case of oil spills, radiation accidents or other emergency situations. It is essential to get a few voice circuits or possibly data links into the area to help control and coordinate emergency rescue, Whittick noted.

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Basic/Four Systems are also marketed in more than 30 foreign countries.

Air Force Centralizes DP at Cape Canaveral

Special to CW

CAPE CANAVERAL, Fla. — By early summer, a single integrated computer complex will take over all scientific and business processing as well as the range safety computing functions at the Space and Missile Test Center's Eastern Test Range (Samtec/ETR).

Range safety computations and scientific data processing formerly were performed by eight computers, grouped in three separate configurations, each with its own noncompatible operating system.

The complex — designed around two Control Data Corp. Cyber 74s and one 6500 — will replace three IBM machines and five 3000 series CDC computers, according to Col. R.A. Gardner, director of technical operations for Samtec/ETR. A single operating system — a modification of CDC's standard NOS software — will replace the three separate systems used for preflight monitoring, real-time range safety data acquisition and postflight data reduction, Gardner indicated.

Richard F. Douglas, chief of data processing, and Maj. Frank DelPrete, the project officer responsible for implementing the complex, said the two Cyber 74s, along with a CDC 65125 mass storage subsystem — the Cyber-compatible version of CDC's 38500 IBM-compatible mass storage — will be acquired in September. The mass storage system will be located at the cape and connected via a 1.5M-bit data link to the CDC 6500 housed in the technical laboratory at Patrick Air Force Base, 30 miles away.

The CDC 6500 will be used mainly for program generation, debugging and data reduction and will serve as a remote job entry system to the 74s.

When the system is complete, according to DelPrete, the present 18 remote data entry terminals will have been increased to 30, located throughout the cape and the technical laboratory at Patrick.

"One requisite in designing the complex," DelPrete said, "was to use off-the-shelf-hardware, modifying the software if necessary, rather than the hardware. This will keep us flexible so that we can add or subtract equipment as our mission changes."

Supports Varied Missions

Samtec/ETR provices support the National Aeronautics and Space Administration (Nasa), the Air Force and the Navy, as well as an occasional launch for a friendly foreign government. Now that the manned space program is at an ebb, unmanned satellite launches using Delta, Atlas-Centaur and Agena boosters comprise most of the workload at Samtec.

Activity is increasing on the Trident program as the fleet ballistic missile system approaches the operational stage. Continuing test launches of the earlier Poseidon and Polaris submarine-launched missiles also occupy the center. Later, the space shuttle will be launched from the cape.

After launch, the tracking station at Patrick passes off control to downrange tracking ships and shore stations in the Grand Bahamas, Turk, Antigua or Ascension islands. This radar and telemetry data is fed in real time from the computers to the range safety officers, who must make go/no-go decisions based on the data displayed on four CRTs.

Updating the computer complex is the latest in a series of range modernization steps taken over the past several years. Completed in mid-1976, the range added on-axis tracking capabilities to most radars. This capability ties the radars directly to on-site computers so that they can predict 10 times each second the location of the object being tracked.

These four large CRTs show computed track and position in longitude, latitude and azimuth, with actual vehicle path superimposed. Variance is displayed numerically and graphically.

An outline of the terrain over which the vehicle will fly is also projected on the CRTs so the range officer can make an informed decision to destroy the vehicle if deviation from normal flight might bring it over populated areas or the craft's velocity is too low to inject it into orbit.

During ballistic missile tests, data fed into the computers from the downrange tracking radars is used to predict and display the impact point.

Meteorological information, such as wind speed and direction and lightning path prediction, along with other vital weather data, is processed in real-time by the Cyber 74s through a special interface. This real-time data is later transferred to the CDC 6500 at Patrick in batch mode for reformatting and archiving.

Orderly Transfer

Although production work is confined to five days a week, the central computer complex operates around the clock, with the weekends devoted to

(Continued on Page 43)

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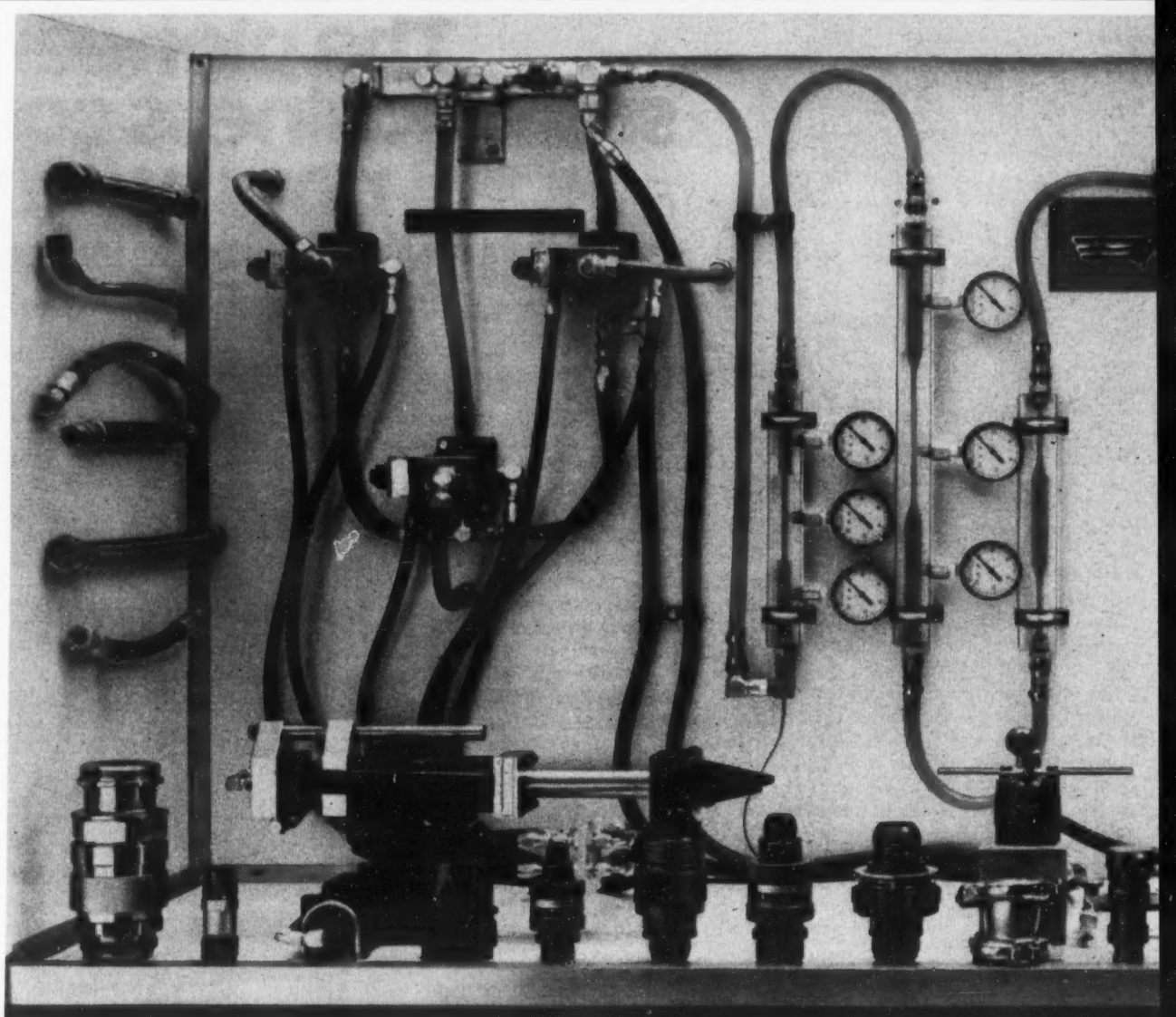

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"We needed a distributed processing system that could centralize control of information processing and still permit inquiry and input from local terminals," explains Howard Selland, Aeroquip Corp.

"And besides that, we wanted simultaneous local applications like word-processing, realtime data collection, and online communications. And with plants and offices worldwide, we had to have the ability to get the equipment serviced in remote areas. We went with the IBM Series/1 because it fulfilled all those requirements, and more."

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High Schoolers to Represent U.S.

California Students to Compete in Jerusalem

LOS ANGELES — Three students from Santa Monica High School, Eric Enderton, Chris Pettus and Alex Melnick, have been named the U.S. winners in the International Youth Competition in Computer Science held May 5 at the University of Southern California here.

The students are now eligible to compete in the Aug. 9 International Finals in Jerusalem against teams from Israel and Great Britain for the world championship. The contest is part of the Third Jerusalem Conference on Information Technology being held Aug. 6-9.

Three U.S. data processing industry companies have contributed funds to make possible the participation of a U.S. high school team in the finals to match their knowledge of computer systems with those from other nations. U.S. sponsors of the competition are Automatic Data Processing, Inc., Dataproducts Corp., and Brandon Applied Systems, Inc.

Prizes for the winning teams in the International runoffs will be: first prize, $1,000; second prize, $600; and third prize, $200.

Invited Speakers

The theme of the Jerusalem conference will be "Computers, Communications and Technology Transfer." Invited speakers and their topics include Jean Sammet (the state of programming languages); George Glaser (electronic funds transfer system); Iann Barron (the future of computer technology); Uzia Galia (building computers in a developing country); and David Golden (technology transfer).

In the area of computer and communications technology, sessions will focus on "Fault-Tolerant Computing"; "Applications of Machine Descriptions"; "Hardware and Software Technologies for Developing Countries"; "Emerging Domestic and Regional Communications Satellite Systems"; "Advances in Data Communications"; and "The Future of Peripheral Devices and Network."

Besides the student competition, there will be a computer chess tournament, social events and professional tours to various Israeli university and industrial computer installations.

Those wishing to attend the conference as delegates can obtain program information by writing to JCIT3 Secretariat, Department of Computer Science, 4226 Ridge Lea Road, Amherst, N.Y. 14226.

Air Force Groups Test Range DP

(Continued from Page 42)

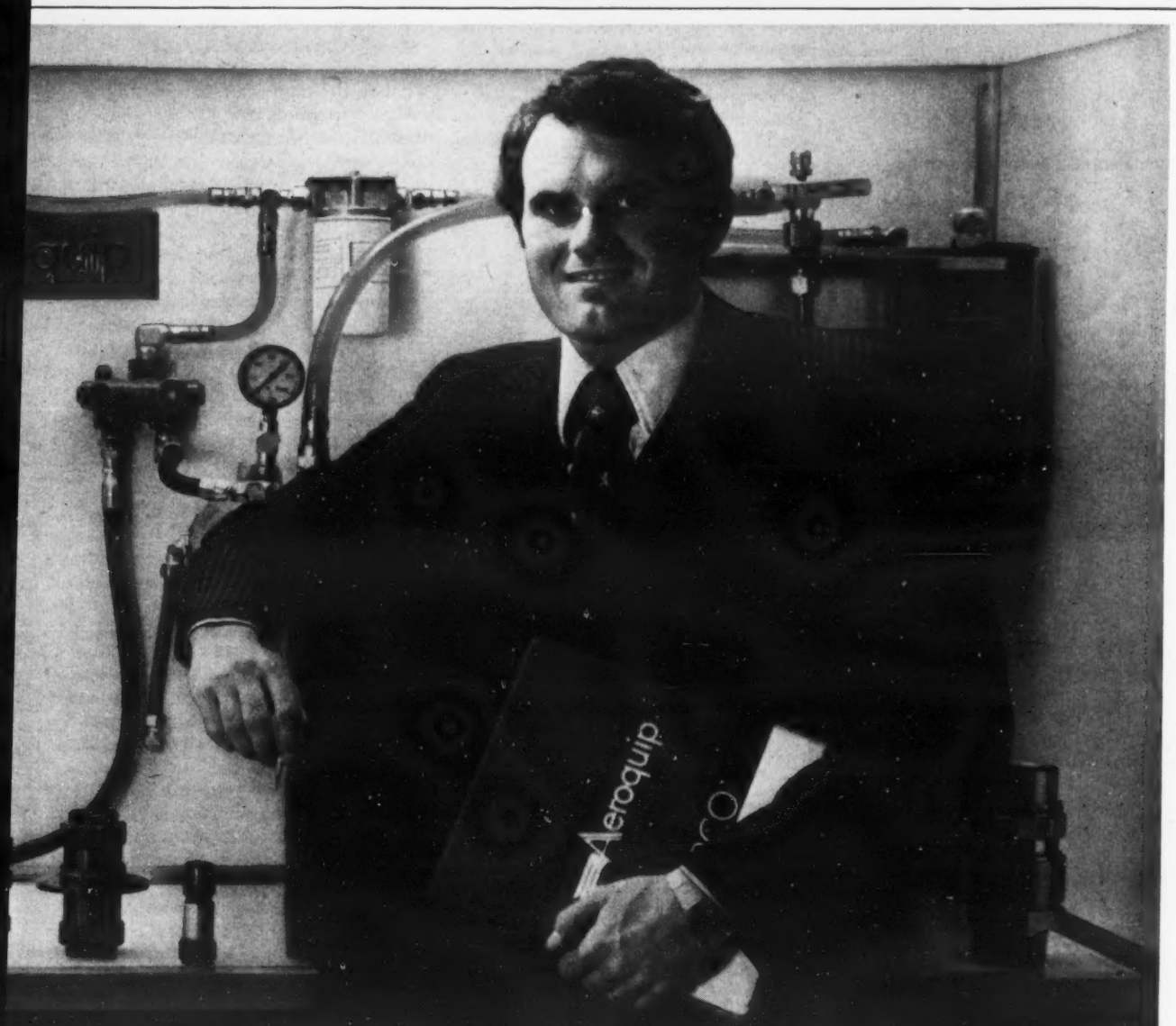
data reduction and data archiving. This requirement has made it mandatory that changeover to the latest computer system be accomplished with a minimum of downtime and that reliable operation from the moment of takeover be assured.

To assure no downtime in range operations, both the old and the new computer systems will operate in parallel for at least three successful launches, DelPrete said.

Range safety requires that telemetry data from the launch vehicle must be acted upon in real time and that no data be lost.

The two Cyber 74s are linked to a common 2M-byte extended core storage and a CDC 6683 satellite coupler that provides for automatic takeover should one processor go down. Both Cyber 74s will be processing the real-time data simultaneously so that if one machine fails, the backup will be able to continue the range safety displays.

By mid-December, the Air Force is scheduled to have a CDC 65125 mass storage system integrated into the computer complex. The CDC 65125 will provide on-line storage equivalent to 15,000 reels of magnetic tape, with most data accessible in less than 10 seconds.



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Howard Selland, Corporate Administrative Systems Manager, Aeroquip Corporation, A Subsidiary of Libbey-Owens-Ford Company

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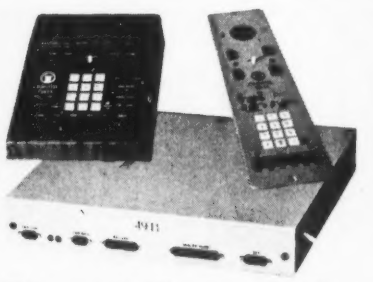

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System Gives Record Company Ear for Hits

NEW YORK — Within three days of the release of Stevie Wonder's recent album, "Songs in the Key of Life," Olympia Record Industries, Inc. knew it would be a hit and immediately geared up for a sales trend that was still going strong four months later.

There was no intuition or guesswork involved. A computer-based system that keeps close track of new release sales on a day-by-day basis provided the key information that told Olympia executives the industry had a hit on its hands.

The same system provides tight control over items in stock and supports efficient fulfillment of complex and lengthy customer orders, an Olympia spokesman said.

The system was tailored to Olympia's needs by the Business Systems Division of Automatic Data Processing, Inc. (ADP). In equipment, it involves one small, on-line terminal in Olympia's offices linked by a dedicated line to a 64K Microdata Corp. Reality minicomputer in ADP's regional data center in Clifton, N.J.

The problems which led Olympia to use this system resulted from the very nature of its operations. The distributor of hi-fi phonograph records, tapes and accessories was formed in 1954. With 1,000 customers, yearly volume is in the $5 million range.

The company employs 47 people, including eight salesmen. The warehouse is part of the headquarters facility, and an administrative staff of seven people works closely with warehousing personnel.

"We have to move swiftly to take advantage of the public's demand for hot items, but at the same time we must be sure we do not tie up capital in stock that will only have to be returned [to the manufacturer] if it doesn't sell," according to Ervin Litkei, president. "This puts a premium on the quick availability of current and accurate information."

Since Olympia's customers also return unsold items, returns from each of the company's 1,000 customers must be closely tracked.

"It costs us about $15 to process $100 worth of returns," Controller Betty Rodgers said. "A customer with a high rate of returns cuts into our profit. We also have to guard against any possibility that a customer might return merchandise purchased from another distributor."

A high percentage of Olympia's customer orders are termed "general" orders, where a department or chain store buyer is ordering centrally for 500 or more stores. The customer selects the items and quantities to be sent to each store. It's then up to Olympia to look up ship-to information and process shipments to each of the stores involved.

The typing and related paperwork for one general order had reached the point where several members of the office staff were tied up for a full week.

Determining whether a new release was likely to become a hit was almost entirely a matter of intuition. And if a key person in the office or warehouse was out for any reason, operations were impacted.

Move to On-Line

Olympia had been using ADP's batch services since 1970 to handle accounts receivable. In 1976 Rodgers, working closely with ADP systems analysts, developed a system calling for on-line data processing to support accounts receivable with quick accumulation of data on returns. The system also helped marketing and inventory control.

Stored in the data base at the ADP service center are complete details on each of Olympia's customers: names and addresses with ship-to information, current balance outstanding, returns and other pertinent business facts.

Also in storage is inventory data — a unique number for each item, the title of the song or album, artist or group name, manufacturer, shelf location indicating where the item is stored in the warehouse and a list price code. Close to 1,000 items are stored in the data base, which can be accessed only by authorized Olympia personnel using their distinct identification codes.

As new releases are issued, identifying information is entered on-line through the terminal keyboard. New release lists are printed on the same terminal and distributed to customers. As orders come in they are also entered through the terminal, with day-by-day information available to track sales.

Catalog Generated

Every other week a catalog is printed on the terminal that lists every item with its related information. Items no longer selling are dropped simply by entering the item number and the letter "D". This automatically deletes the item from the data base and generates a list so the items can be pulled physically from inventory and returned to the manufacturer.

The updated catalogs are distributed to customers, who write their orders on order sheets coordinated with the catalog data.

When a general order is received, the basic details are entered through the terminal. The system automatically "looks up" ship-to and related data. It also prints packing slips complete with each item's warehouse location.

As customer payments and returns come in, they, too, are entered through the terminal to instantly update the accounts receivable file. All related selling and payments information is in the central data base, accessible through the terminal.

Paperwork for general orders is now completed within two days, without impacting staff time, and data is swiftly retrieved on the terminal for any given customer to find current returns, dollar amount, current balance due and year-to-date invoicing with returns, Olympia said. Similar data is available for each individual stock item.

Since the system went into operation in August 1976, returns have dropped by about 12%, the company reported. And, with all the required ordering and order processing data in one catalog, order fulfillment efficiency has improved about 50%.

Warehouse picking efficiency has also been significantly improved, since the time location is clearly printed on all packing slips. New people become proficient much more quickly, according to the company.

As to overall office efficiency, Rodgers estimated the seven-person staff is now at least 25% more productive.

The cost of this service is $1,000 per month, including the terminal.

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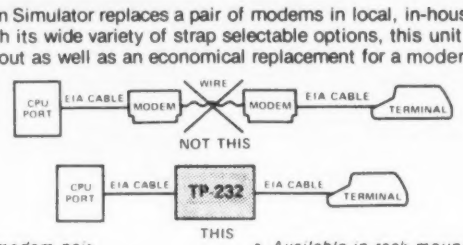

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With Vendor's Cooperation

Explorer Scouts Getting Taste of DP Careers

By Denise Petski
CW Staff

FRAMINGHAM, Mass. — Explorer Scouts here not only tie sturdy square knots, they are also writing code and getting a taste of life in various computer careers.

About 15 boys and girls between the ages of 14 and 20 meet once a week at Prime Computer Co.'s Industrial Park facility to listen to lectures on marketing, engineering and employee relations presented by Prime employees. The talks include information about the kind of educational background needed for each type of job.

After each session, the scouts use terminals linked to the firm's 500 engineering production system — a network of three systems and 60 terminals — to write programs and play games. The scouts use three languages: Fortran, Assembly and Basic, with Basic used most frequently, a spokesman indicated.

There are about 35 games available to the scouts via Prime's terminals including golf, "Adventure" and "Hangman."

Computer golf consists of an imaginary course of 18 holes complete with obstacles. The compter is programmed from hole to hole and the operator is given a hole distance and terrain specifications. The operator picks a club; the computer then swings it and tells the operator where the imaginary ball lands.

"Adventure" is a game that gives the operator few directions. The operator is taken on a jaunt through a cave with 141 rooms.

The computer gives the operator commands in English and tells the operator the route he is to take via compass directions. The computer then tells the operator what it sees, according to a Prime spokesman.

The object of the game is to find the buried treasures in the cave and return them to a specified place outside the cave. The average completion time of any game is eight to 10 hours.

Favorable Reaction

The reaction of the scouts to the project has been very favorable. Glen Campbell, 16, of Natick, said he had taken computer courses at school and was delighted with the idea of learning more about Basic and programming.

Bob Collins of Westboro High School was enjoying writing his own Fortran program, and a student from Hudson Catholic School, Ed Beuchemin, was so excited about the Explorer program he was considering a career in computers even though he has no prior computer experience.

The project was developed by Jim Ward, 21, a programmer at Prime and himself a former Explorer Post member at Honeywell Information Systems, Inc. Ward said his career decision was influenced by the program.

Law Enforcers Discuss DP Unit

GAITHERSBURG, Md. — The International Association of Chiefs of Police (IACP) is establishing a special interest Unit on Law Enforcement Data Processing.

At present, there is no unit within the IACP where views and concerns of the law enforcement DP community can be expressed. The unit will try to establish professional standards for the administration, management and operation of law enforcement DP.

The unit will also serve as a combined source of administrative, managerial and technical know-how to which law enforcement executives may direct questions of DP.

Its primary functions will be to provide an adequate organization and opportunity for members to conduct meetings, discussions, research and evaluations and transact any necessary business.

Membership in the unit will be open to all active, life and associate members of the association in good standing who are now or have been involved in the administration, management or operation of law enforcement DP.

Those interested in the unit should send their name, title, agency and address to Larry Goldman, IACP Headquarters, 11 Firstfield Road, Gaithersburg, Md. 20760.

ICCP Changes CCP, CDP Dates

CHICAGO — The Institute for Certification of Computer Professionals (ICCP) has announced changes in its examination schedule for the coming year to bring it more in line with traditional academic year.

The Certificate in Computer Programming (CCP) exam will be offered Dec. 9, 1978, and the Certificate in Data Processing (CDP) examination will be offered on May 5, 1979.

The institute also announced a scholarship award will replace the previous monetary award.

For information on the institute and its programs, a report is available from the group at 35 E. Wackr Drive, Chicago, Ill. 60601.

After the sword swallower, the snake charmer, the gypsy fortune teller, the human cannonball, the amazing tattooed lady and JoJo the dog-faced boy, come see some magic at NCC Booth 4135.

See the magic of the biggest systems advance since the 370—a brand new breakthrough computer by a computer company you've never heard of. To discover more about who's putting on this magic show, turn to page 159.

Editorial

IBM Playing Catch-Up

IBM's E series of computers is expected soon (see story on Page 1) and with it a whole new price/-performance ratio for the small and middle-size classification of computer users.

In the past, such announcements have sent the competitors scurrying for catch-up solutions to the new IBM products, but this time it appears the tables have turned and it is IBM that is playing a catch-up game.

This probably reflects a maturing of the industry to some degree and helps illustrate the overall vitality of the computer field today.

IBM has been slow to announce radical new price/performance machines for two reasons. First, it appears to be having internal problems between its General Systems Division and Data Processing Division deciding which will actually market machines in the small to medium-size market.

Second, and probably more important, the firm is leery of dramatic price/performance units because it is worried about the effect such systems wold have on its huge rental base of equipment.

In the past, this rental base has been a boon to IBM, generating revenues year after year, but now it may be more of a millstone.

While IBM has been worried about the effect of superior price/-performance computers on rental equipment installed at user sites, others in the industry have leapfrogged it in technology.

The competition has come from two directions: first, the direct plug-compatible CPU manufacturers and second, the minicomputer makers.

Both of these groups have been able to take advantage of the tremendous advances in semiconductor technology over the past few years to bring out computer systems that offer IBM users superior price and performance — all while IBM has been waiting for its installed rental base to age enough so that the firm could profitably displace it.

But now, faced with the new competition, IBM will have to react, and that reaction will probably begin a new wave of price cutting and technological improvements in the computer industry that will give users more and more "bang for the buck" over the next few years.

Ever since IBM reacted to the Amdahl Corp., Itel Corp. and Control Data Corp. plug-compatible replacements, users on the upper end of the computing spectrum have been able to get superior price/-performance machines from IBM as well as the independents.

It appears now that users of the smaller machine types finally will also be able to get the benefits of the recent technology advances from IBM as well as its competitors.

THE
LOST LOVE
FINDER
TERMINAL
Q. AFTER ALL... THESE...YEARS I CAN'T BELIEVE IT. IS IT REALLY ♥YOU♥, PRISCILLA? MY LOVE, MY HEART OF HEARTS, MY TREASURE...
A. YES, MILES, BUT THE ONE I ADORE WON'T SPEAK FOR HIMSELF... CAN YOU TELL ME HOW TO GET IN TOUCH WITH ♥JOHN♥!?
Computerworld

Data Past

Five Years Ago
June 6, 1973

LOS ANGELES — In 1972, Jerry Neal Schneider "clawed" his way into the Pacific Telephone and Telegraph Co. computer system to steal more than $1 million worth of electronic equipment and wound up serving 40 days of a 60-day sentence for grand theft. One year later, he became a systems consultant for EDP Security, Inc., a company he helped organize. Schneider explained that the best way to develop confidence in a system is to try and break it, and "we feel we can break into any system."

— — —

NEW YORK — The first National Computer Conference and Exposition opened here this week with attendance anticipated to exceed 30,000. Two hundred sixteen firms were expected to exhibit in 620 booths in the New York Coliseum.

Eight Years Ago
June 10, 1970

NEW YORK — Control Data Corp. extended the flexibility of the 6000 and 7000 "supercomputer" series with new versions of the 7600, a new 6200 system and the compatible software to facilitate user upgrading through both of the series.

— — —

LOS ANGELES — A computerized vote count stirred up a controversy in California that threatened the use of punch-card voting in state elections. Dr. Leonard Larks, head of the Democratic Party's Los Angeles Election Certification Board, expressed concern over five core dumps that occurred during the evening vote count for no apparent reason. Other complaints concerned the nondelivery of 40,000 sample ballots; a failure to mail, as promised, some notices advising citizens where to vote; a failure to enclose some candidates' literature; wrong addresses for polling places; wrong configurations in the sample ballots; and the mailing of one party's ballot to another party's member. All voting lists and mailings were handled by computer.

Letters to the Editor

Fear of the Unknown

Remember the future, Joseph Schengili ["Checklist Shows if APL Is Suitable Language," CW, May 8]. As the CPU vs. programming cost ratio progressively declines, APL becomes more attractive for implementing a system in any of your suitability categories.

Less code is needed in APL to do the same job than in another language, therefore expediting development and especially maintenance, which is required in *any* system of long-range value. Also, intermediate results can be checked and errors corrected on the fly, and since there are less than 10 basic errors, a code book need never be consulted and then interpreted, all greatly reducing testing time.

The advantages to the programmer are obvious, and as his standpoint becomes more respected, the benefits accrue to the user. An admittedly simplistic questionnaire such as the "APL Checklist" can only serve to bolster fear of the unknown.

Michael Blum
Stamford, Conn.

Lecht's Ideas Off-Base

Charles P. Lecht must be an amazing man. He is oft quoted, heavily excerpted, readily transcripted; in short, an "authority." And, although I've never heard him, his speaking style must be very appealing.

At least, I hope so, because much of what he is quoted as saying at the Mid-Atlantic Computer Expo '78 [CW, May 22] is preposterous at best.

For example, "computers in the sky," far from being maintainable and enduring, would be cost-prohibitive because of the necessity for redundant circuits, expensive communications gear and the classical "power, weight, volume" limitations of satellites. Making repairs would be a neat trick.

The idea of a "natural, easy-to-use man-machine interface" has always *seemed* attainable. But unless the very real problems of artificial intelligence are solved first, the computer will continue to be picky and exacting — in short, hard to live with. Conversely, if artifical intelligence is solved, the need Lecht mentions for language skills will go right out the window along with the programmer.

His statements on management don't even rate consideration.

I guess if you say something crazy enough, people will believe you every time.

Alan P. Schlutsmeyer
Pasadena, Calif.

Different Type of Abacus

In answer to W.B. Adams' letter in the May 22 edition of *Computerworld* in which he references his "abacus," the device he described, four counters below and one counter above the bar, is a soroban. It is Japanese in origin and its beads (or counters) are slightly beveled or "pointed."

The Chinese abacus has five rounded beads below and two above the bar.

I have seem "impure" variants of both these calculating devices, but as to performing hexadecimal arithmetic, I prefer an electronic calculator. But then I use a power mower on my lawn, so it may just be laziness.

T. Eugene Gretsch
Minneapolis, Minn.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

Reader Commentary

Red Tape Can Be Bonus If You Have Imagination

By Joseph T. Rigo
Special to CW

My friend, Bubbles McGuire, was in town recently to pick up a shipment of money. He invited me to go along on the ride to the cargo terminal at Kennedy Airport.

"The software business is great," he said, "especially if you're user-oriented."

Bubbles used to run a research laboratory in New Jersey. He had 150 computer scientists studying bubble memory. It was all financed by government grants, but the field became too crowded.

"There was just too much competition for the grant money," he explained, "so I decided to dump Bubbles and get into discrimination."

"Huh?" I asked cooperatively.

"Discrimination is the great new growth industry," he said. "The government is involved in a big way. That means a lot of paperwork, and nothing can be better for anyone trying to sell computer software. Discrimination is opening up a whole new world of computer applications."

"Is that why we're going to the airport, to pick up money from Washington?"

"No," he said. "This shipment is from our Fair seminars in Texas. We've been selling systems like they were free drinks at a Guide meeting."

Fair is Bubbles' personnel records system. Companies use it to prove they comply with the Equal Employment Opportunity act and other laws. It keeps track of each employee's race, religion, sex, country of origin and anything else that may be needed.

"The seminars are terrific," Bubbles said. "First, we have a guy come down from the equal rights agency in Washington. He tells our prospects about all of the records they're required to keep to provide they don't discriminate. The guy just tries to be friendly and helpful, and he scares the pants off them every time.

"Then we have a congressman talk about new legislation that's in the works. He tells them about the records they're going to have to keep in the future.

"We've actually had guys collapse after hearing that talk. Our salesmen complain that some of the people are shaking so much they can barely sign our contract."

We pulled up at the cargo terminal. Bubbles identified himself, and two men began loading a half dozen

(Continued on Page 48)

Reader Commentary

Computers, Bureaucracies Have a Lot in Common

By Dennis L. Miller
Special to CW

Legislators and top government officials are learning computers can cause nearly as many problems as they cure. Chief among those problems is the self-perpetuating bureaucracy each DP installation creates.

Why have computers gained popularity in bureaucracies? The obvious explanation must be natural compatibility, symbiosis — a fulfilling of mutual needs.

Computers have characteristics which serve to compliment those commonly attributed to bureaucracies. Many facets of computing emulate bureaucratic methods. For example, the following are presented as the most obvious similarities and symbiotic relationships between bureaucracies and computers:

• The central processor of a computer system is a manager. Some persons attribute the real management process to software programming within the central processor. Others are naive enough to suggest that the real manager is the computer operations supervisor.

Anyone who has worked in a computer center knows that when the CPU hiccups, everybody jumps. Even the computer supervisor jumps.

If the slightest thing goes awry in the central processor's domain, all other activities stop until that problem is fixed. The CPU runs the computer center in every sense of the word.

• The central processor is too busy to get involved in details. It delegates major tasks to peripheral devices (called "controllers").

It *never* reads a punched card; that task is too demeaning. Frequently the central processor remains idle while the task of reading a card is delegated to a subordinate controller device which in turn delegates the task to a card reader device.

• The input and output of a bureaucracy is analogous to that of a computer: frequently unrelated.

• The processes a computer undertakes are closely controlled by a set of procedures called a "program." The computer does nothing unless it is in the procedures. It is very much like a bureaucracy which is run by a procedures manual.

When presented with a problem, the typical bureaucrat's response is, "I can't help you, that is not my responsibility."

• The computer center has a stock

(Continued on Page 56)

The Taylor Report

Sears Rip-Off Deflates Post-Christmas Savings

By Alan Taylor
Special to CW

Annual sales in January help smooth over the peak effect of Christmas shopping. It is traditional for department stores like Sears to have these big sales. However, from the billing programs that are used in February and March, it looks as though some of the supposed savings to consumers are fictitious.

The output of the billing program sent to reader Dolan appears on Page 56. Statements for three consecutive months are shown. In the Feb. 6 statement, a minimum payment of $10 was demanded within 30 days of Feb. 6th, and the full amount due was shown as $26.42.

The March 6 statement said "The amount due shown above includes a past due amount. You should send entire amount now . . ."

Technically, this is wrong. There is no "amount due shown *above*" at all! What Sears seems to be referring to is an amount shown below as being the "previous balance."

"Entire installment payment now" appears to refer to the $10 of the minimum payment on the Feb. 6 billing. However, to find the explanation even in the February statement, you have to read the fine print — "If you prefer to pay in installments . . ."

Nowhere on the March bill is there any statement as to what this "entire installment" is, so the consumer is left totally up in the air.

Real Problem Crops Up

While these are technically and professionally poor practices from a DP point of view, the real problem was not made obvious until the April invoice came out on April 11, dated April 6. This showed that a payment of $26.42 was credited on March 8.

Now, $26.42 was the exact amount that was the "new balance" on the Feb. 6 payment. And the February statement said "To avoid a finance charge next month, pay this amount within 30 days of billing date."

I don't believe that Sears can't count to 30 and I certainly know Dolan can. Thirty days after the billing date, on March 8, he paid in full.

So there is absolutely no question that the statement about the "past due amount" put in on a billing date on March 6, publication date March 11, was false. There is also no question that the "finance charge" computed on an average daily balance of $26.42 was also false. It is important to consider how this happened.

The Sears program should include a method of counting to 30 days

(Continued on Page 56)

Reader Commentary

In Defense of Carrie: Early Trauma to Blame

By J. Rex Theobald
Special to CW

In a recent article, one of my colleagues attacked End-Around Carrie, an old friend of mine, with all the venom of an adder [CW, May 1]. All that he said was true but, like most platters, the story has two sides. I think it's only fair to give equal time to Carrie's side.

I first met Carrie on a 24-bit bus. She was trying to get to her first class at programming school. Being new in town, she had purchased a memory map at the news stand and tried to locate the school. What she didn't realize was that the school had been rolled out to the drum and was not to be found readily.

The bus driver had straightened her out on that and she now had the correct address, but she still couldn't find the school. It was in this state that I found her deadlocked on the bus.

I was finally able to get her to school by providing her with the correct base register, but by that time her seek had timed out — the class was over.

At that time I came to know Carrie as an honest young lady. She had not yet strayed from the critical path. It was while she was in school that the change came.

Carrie got tired of the long bus ride (she had to go the long way around, past all the I/O ports). She couldn't afford a car, so she went to the bicyle shop and bought a superlightweight Turing machine.

Even before it was unpacked, poor Carrie knew she was in trouble. The instructions were written in Backus-Naur Form. Further investigation revealed that the reason the bicycle was so light was that it had virtual wheels.

Unfortunately, Carrie couldn't return the machine because she only had a handshake interface with the vendor and she had no receipt.

It was in a moment of wrath that night that Carrie began her criminal career and incurred the cycle-stealing charge pressed by my colleague. To defend her against the charge, she hired a lawyer held in high esteem by the local bar association. Unfortunately, in his defense he violated the bar code and the charge stuck. Carrie's morals went downhill from there.

Check a Bit Short

Carrie got a job with the Customer Support Division of Burroughs Corp., where she felt right at home. It turned out, though, that her Boss was more unscrupulous than she was. When she presented her pay-

(Continued on Page 48)

Early Trauma Proved Carrie's Undoing

(Continued from Page 47)
check at the memory bank, there wasn't enough cache to cover it.

She was so upset about it that when she got to work the next morning, she was too-late-to-pocket-select her time card. It was then that she reached her breakpoint and told her Boss that his whole batch was out of balance.

She later repented and tried to get her job back (it had abnormally terminated as a result of her outburst). She decided to break into the data center and alter the personnel records, but when she tried to cut through the Hasp on the computer room door, she found that her file had been corrupted. She never did recover her job.

I would not try to pass this as an argument that Carrie is not to blame for her actions, and only a Maniac would believe that people like Carrie should not alarm the DP community. But we must consider that her transgressions are a result of Carrie's backplane.

The incident with the dishonest bicycle dealer made a benchmark upon Carrie's character which was refreshed by her dealings with the computer vendor and by enough other disappointments to overflow your stack.

What else can we expect from someone with Carrie's backplane? Garbage in, garbage out.

The current state of the industry does very little to help people like Carrie. First, they are difficult to detect. Their fraudulent code is so cleverly written that it must often be inspected with a Micrscope to determine that anything is amiss.

Second, even if captured, the business involved is often so concerned about publicity that it merely hashes the offending code and sends the culprit off.

Finally, even if the offender is imprisoned, the binding time is so short that the misdirected programmer has soon looped back into his old routine.

It was to solve these problems that Restart (Rehabilitative Education for Second-Time-Around Rabble-rousers and Troublemakers) was founded.

This group has been compiled with the specific purpose of fetching even the worst-case offenders and interrupting the awful loop of error, rollback, retry, error, rollback, retry, etc. It is Restart's goal to assemble all of the nation's toughest DP criminals.

Any contributions you make will be used to supply them with enough income to keep them off the terminals and out of the computer rooms of our land.

Contributions may be sent to: Restart, Port 7 Channel 2, Key Word, Fla. Please send only cash.

Remember, when vigilance won't help, bribery will.

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Red Tape Can Bring Windfall

(Continued from Page 47)
crates of money into the back of our pickup truck.

"Couldn't you just have the Dallas office send you a check?" I asked.

"Oh, this is great for staff morale," Bubbles answered. "We let them watch us unloading these crates. It does wonders for productivity. So far, we've been able to drop the company bowling league, the annual picnic and three paid holidays. After our people see these crates come in, they just work like little beavers for weeks and weeks."

Bubbles tipped the two men $100 each, and we headed back into Manhattan.

"The big thing now," Bubbles resumed, "is to come out with a line of minicomputers to run the new software we're developing."

"New software? What can you do that isn't already being done?" I asked.

"That's the nice thing about discrimination," he said. "The law doesn't say what it is. The law just says you can't do it.

"There is a commission to investigate complaints. And the nice thing about a commission is that it moves with the times. A few years ago, companies had to prove that they didn't discriminate because of race. These days it's sex. You have to be able to prove that you hire and promote women."

"What's next?" I asked.

"My guess is gay rights," he said. "It seems to be the strongest new movement, and it looks like it's building. I bet that it's only three or four years before every company has to prove that it doesn't discriminate because of sexual preference."

"Well, maybe," I said. "But so what? That's just one more byte in the employee record."

"No way!" Bubbles thundered. "Not with our government! Our new system will allow for 9,999 variations in preference, and we're thinking of making it even bigger."

"It's crazy," I thought, but I didn't say so. It's hard to be skeptical when you're riding in a pickup carrying six crates of money.

"Bubbles," I asked, "Can you tell me a little bit more about why 9,999 may not big enough?"

Rigo is president of Sysdoc, Inc. in New York City.

Reader Commentary

Towner on Wrong Track

One DBMS Standard Not Enough for Users

By Dr. Ronald G. Parsons
Special to CW

Larry Towner has once again missed the point on the need for data base management system (DBMS) standards. In his article entitled "Multiple DBMS Standards a Ludicrous Idea" [CW, May 15], he claimed Eugene Lowenthal [CW, March 20] advocated a different standard for each DBMS vendor.

Instead, Lowenthal argued for multiple standards appropriate for different classes of users.

The DBMS facilities of an organization must satisfy the information-processing needs across a broad spectrum of users. These users range from the individual completely unfamiliar with DP to the sophisticated computer programmer.

Today, the programmer, because there are too few of them, is often a bottleneck in getting timely information to the end user. Allowing the end user direct access to his information can free the programmer to perform tasks which need his special attention.

Therefore, there is a clearly defined need for a family of DBMS standards, not a single standard.

Advantages of Standards

The fact that there are clear benefits to having standards is well understood. Standards aid the procurement process by improving the ability to evaluate competitive products and by providing a larger vendor choice and increasing competition among the vendors.

The ability to share programs and data among different agencies is improved. The number of people trained in the use of a product is greatly increased. Data and program conversion feasibility and cost is eased.

Standards arise is several ways. The recognized standards-making bodies, by necessity, evolve standards in a painstaking, slow and deliberate manner. One result of this is that standards often lag behind the state of the art.

It is possible for the presence of a standard to retard the pace of the development or acceptance of new products. Many new programming languages have been developed with obvious advantages over Cobol, yet Cobol remains the premiere language in terms of use.

Standards also get created as a result of popularity and widespread use of the products or by policy decisions on the part of user agencies.

Single Standard Problems

A single standard in the DBMS area could very well prove to be too restrictive to satisfy the large variety of needs of the using groups. It is altogether possible some group might be required to forego benefiting from a DBMS if its peculiar needs were not satisfied by a single standard.

The various components of a DBMS will require separate standards to satisfy diverse needs. A data element description language could probably be defined by a single standard to describe the characteristics of individual data items.

Different data structures, however, have unique characteristics that require separate languages to define them. A language suitable for networks is totally unsuitable for describing relations. Many different languages, and therefore standards, are necessary to describe the data manipulation requirements of pro-

(Continued on Page 54)

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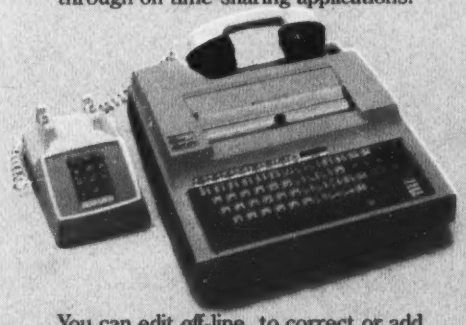

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DP and the Invincibility of Incumbents

Reader Commentary

By Arthur A. Bushkin
Special to CW

The year is 1982 and the upcoming elections are becoming a topic of discussion. The last snows of March are melting, but you are not yet well enough to greet the spring.

Late last month, while returning home from the grocery, you slipped and fell on the ice. The results: a broken leg and a letter four days later from your congressman expressing his concern. He promises to do all he can to assist you.

Now, a month later, you receive a second letter from your congressman telling you he has just learned you qualify for additional medical coverage under the Uniform Health Care Act of 1979. His research has shown you broke the same leg while serving in Vietnam in 1967, and there is a special provision in the health care law that makes you eligible for extended benefits.

You, of course, are delighted by this news, and you silently vow to vote for this man in the coming elections. Curiously enough, only three incumbents are defeated that fall.

Not Far-Fetched

The point of this little story is that it is not at all far-fetched. Unless we begin to address some very serious questions in the near future, it is entirely conceivable that the power of the incumbency in our representative democracy will grow to the point of invincibility.

This will occur regardless of the nature of the campaign financing legislation which the Congress will enact. It will happen even if we are blessed with 535 supremely honest people who attempt to campaign in the most fair and open way possible.

The next decade will witness such advances in information and communications technology, and this technology will become so inexpensive that we will be in danger of having the concept of a fair election rendered meaningless.

This prediction, unlike most political prophecies, actually grows out of the integrity and not the evil of the incumbent. The use of advanced technologies will enable an officeholder to do such a significantly better job of representing and servicing the needs of his constituents that the electorate will be presented with less and less of a rational choice in an election.

Challengers will be forced to use imagery or demagoguery, or to exploit factors not directly related to their particular campaigns, just to attract the voters' attention.

The concept of a fair election as first envisioned by our Founding Fathers is extremely fragile; it can be seriously eroded by the advance of technology, no matter how well intentioned the use of that technology may be. There will always be a large block of voters who will see the personal treatment represented by a letter from their congressman as reason enough to vote for him in a future election.

The danger is that the voter who wishes to make an intelligent choice will have less and less of a basis for doing so; future elections may be decided upon the basis of constituent services rather than legislative substance.

Reasonable Technology

In the vignette presented above, the letters would have been prepared by a desktop computer in the congressman's office. Such a computer will soon cost no more than an electric typewriter does now.

It is also quite likely that a future congressman's staff will automatically develop a data base on each of his constituents. This is essentially feasible right now; much of the pertinent information is readily available in the public record. The shrinking cost of technology will only make this practice more practical.

Also, unless the appropriate safeguards are undertaken — and this is surely not a foregone conclusion — the computer in a congressman's office will be able to call other computers, via a standard telephone connection, for the purpose of querying their data bases so as to augment its own files on each constituent. This, too, is technologically feasible today.

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rotational delay:
2.0ms vs. 8.3ms,
and data transfer time:
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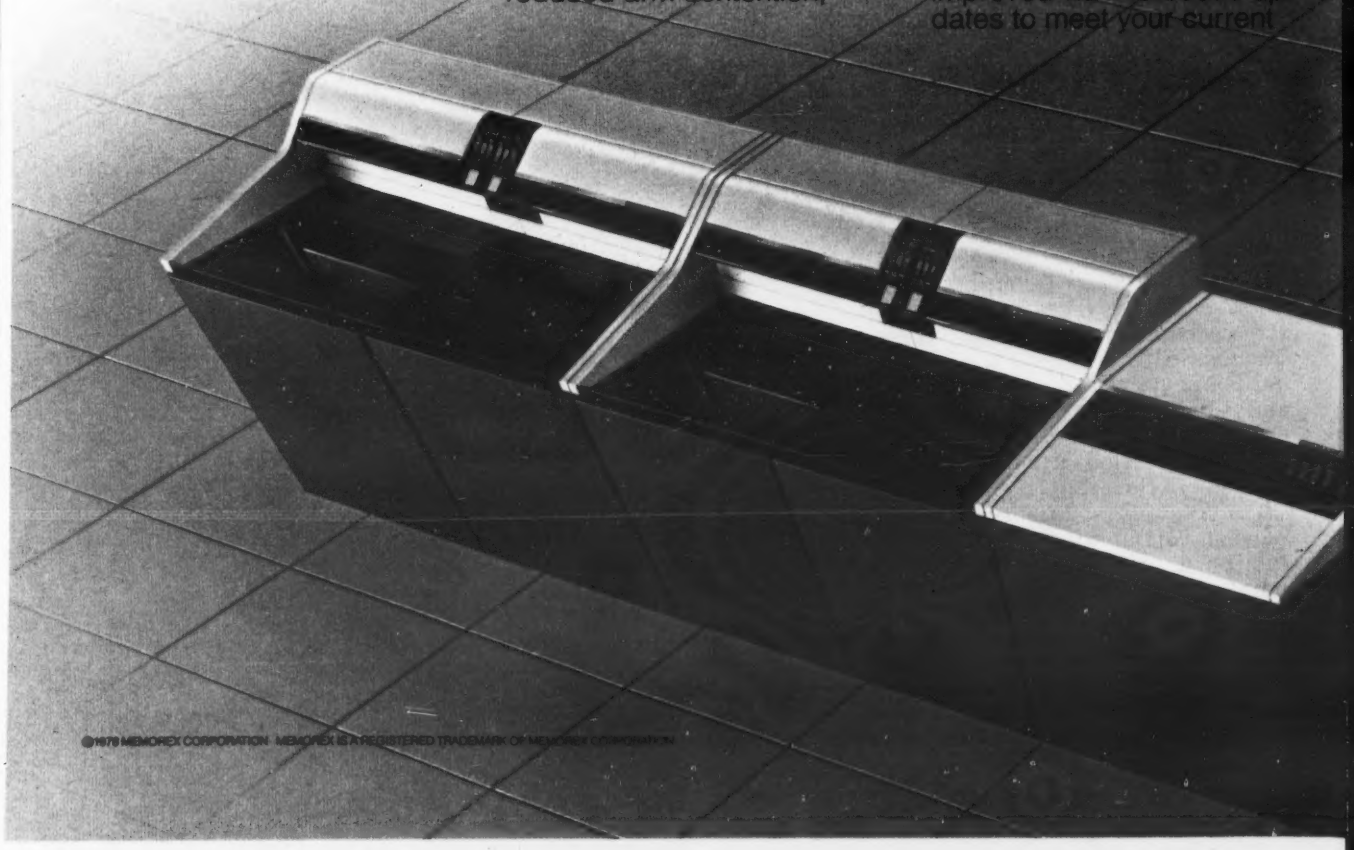

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A Prediction That Has Become Truth?

The natural reaction to this type of prediction is to view it as an invasion of personal privacy and to demand that the appropriate precautions be taken. But the issue of personal privacy notwithstanding, it is important to recognize that at least part of this trend is not the embodiment of some technological evil, but rather is actually quite reasonable.

Only its portents for the future of representative democracy need concern us, provided of course that the appropriate privacy safeguards are employed.

Example for Today

Using an example which is applicable today, a congressman can already send machine-produced letters to members of his constituency who are interested in any particular issue, perhaps telling them of his latest action in the area. The congressman already has the franking privilege, and it is certainly easy to accummulate lists of members of a constituency interesting in any way to him because they sign petitions and advertisements, they join local issue groups and so on.

Even today, it is a poorly organized incumbent who does not seek to identify preference groups of voters as he seeks reelection. Furthermore, all of this information can be correlated with the past election history and the census data for each precinct within a district.

The emergence of the computer in the last decade did not make all this possible; the computer just made it more practical. In the next decade, technology will simply become more advanced and less expensive, and its impact on the electoral process will be far greater than we might imagine.

Buskin, director of information program at the newly formed National Telecommunications and Information Administration, wrote this article in 1974; it was printed in the Congressional Record *in May of that year. According to the author, it was penned originally as a technology forecast that has turned out to be valid.*

It is easy, though, as one lays blame on the computer, to miss the larger implications of advancing technology. The use of an in-office computer to accumulate publicly available data on a congressman's constituency, done properly and with a respect for personal privacy, is a legitimate function of representation. The more an officeholder knows about his constituents, the better the job he will do.

The campaign reform issue is that the better the job he does, the more difficult he is to defeat, particularly if he has access to advanced technological aids.

Equality for Challengers

Performance in office cannot be limited, however, the way campaign contribution or campaign spending can. Therefore, unless a challenger is provided with compensatory, if not comaprable, access to information and communications technology, he will not possibly be able to make a credible challenge.

In the example above, the issue is whether data bases which have legitimately accrued as a function of representation should not also be made available in some fashion to bona fide challengers prior to an election. After all, is this not public data collected with public funds?

The basic spirit of most campaign reform legislation is a fundamental equalizing of the opportunity to seek public office. This is to be accomplished through a proposed equalizing of services, paid for by public funds or as a result of a limit placed on campaign contributions or spending, or both.

The Real Dilemma

The issue that we have yet to address is an equalizing of capabilities. The dilemma is that some of an incumbent's increased capabilities derive not from sources which can be regulated, but from the impact of advanced technology on the incumbent's performance of his constitutionally mandated responsibility of representation.

And the time to confront this issue is now, for the march of technology will not be deterred.

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Needs 'Constructive Criticism'

APL Suitability Checklist Could Be Better

By George F. Weiss
Special to CW

Since I use the APL programming language extensively and exclusively, I take special notice of any mention of APL in the news. Often I am disappointed with the quality of the articles discussing APL. Such was the case when I read about the APL suitabilty checklist in the May 8 issue of *Computerworld*. I believe Joseph Schengili is on the right track and has a good idea. His idea, however, was not thoroughly thought out and needed much work before it was ready to publish.

One particular gripe about his suitability questionnaire is that although he weights the answers to each question, he does not weight the questions. Certainly the answers to some of the questions would carry greater impact than others.

A second gripe is the lack of interaction between questions. For instance, the CPU load (question 8) may not be important, if the run frequency (question 3) is low.

In addition, Schengili has entirely left out some questions that ought to be asked. For instance, is the application to be run in-house or on an outside time-sharing service? What is the application?

Some applications are inherently well-suited to APL. One such application is financial planning, which requires the manipulation of time series and the consolidation and printing of spread sheets. APL's 60 or so operators "operate" on vectors and matrices as well as single numbers, making program loops virtually unnecessary. A time series is nothing more than a vector and a spread sheet is nothing more than a matrix.

Schengili has succeeded in compiling a list of some questions that should be asked when considering APL for an application. However, the list is not exhaustive and his means of quantifying the answers is poor.

I like Schengili's idea but feel it needs improvement.

Weiss is with Weiss Associates, systems planning consultants, in Danbury, Conn.

Reader Commentary

Letters to the Editor

Missing Letter Changed Meaning

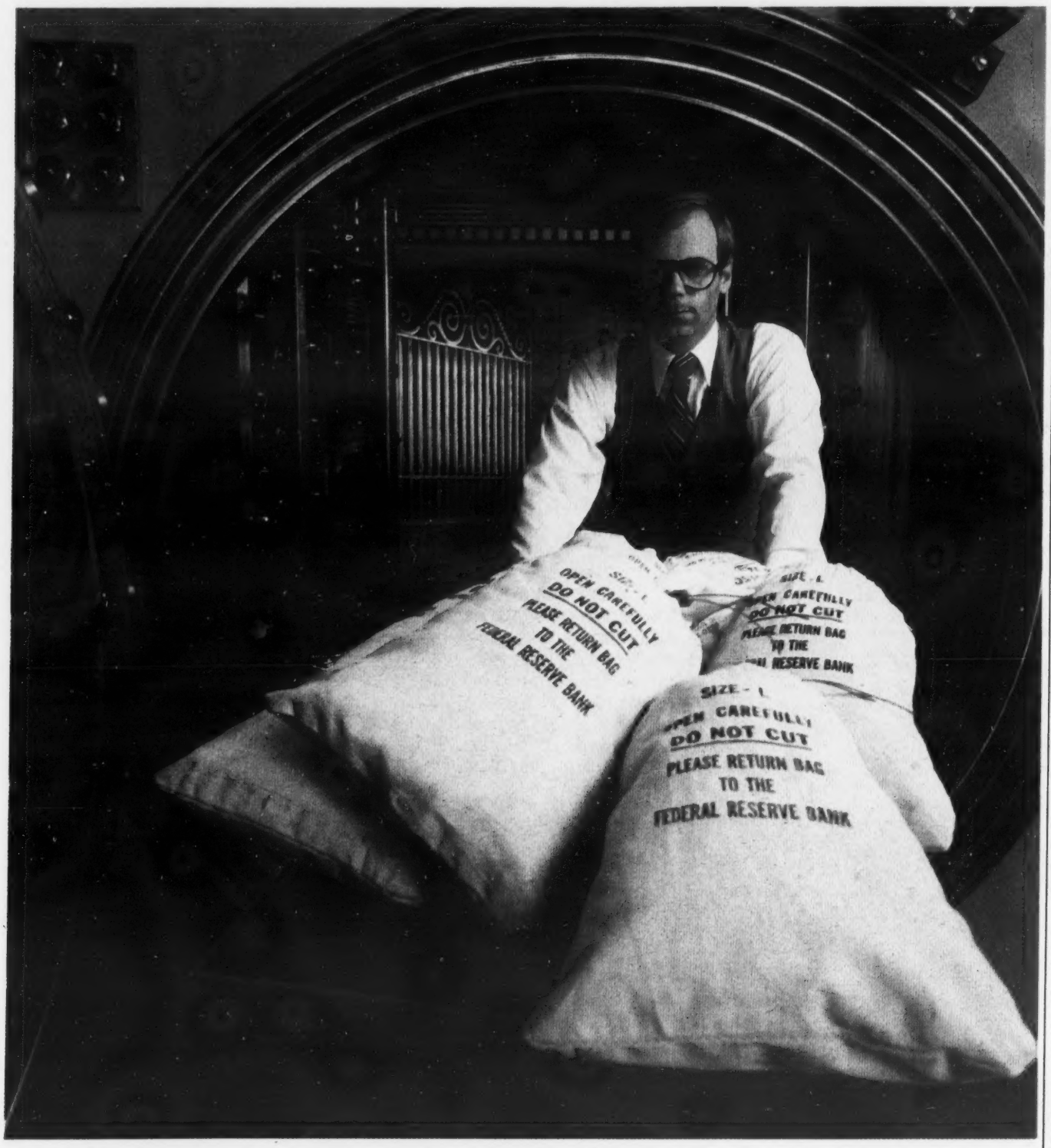
Having been away from the office for the past month, I have just seen the April 10 issue of *Computerworld* containing my article on the potential impact of the IBM 5110 on distributed data processing ["IBM 5110 to Enhance Distributed Data Bases?"].

Let me correct one typographical error which, unfortunately, makes sense as printed but is the opposite of what I wrote in my manuscript. Following my citing effortless transfer of an IBM APL program to a Digital Equipment Corp. system, the next-to-last paragraph in the printed article started off: "This is not typical of APL . . . "

I wrote: "This is not atypical of APL . . . "

One of the virtues of APL is that it is inherently a compatible and transportable language. It is not uncommon for a function written for one system to be executable on another with no or minimal changes.

Brooke Tompkins
Think, Inc.
New York, N.Y.



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Model 204

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Inaccuracies Noted In Article on Iran

One of the difficulties of working in a foreign country such as Iran is keeping informed as to the latest hardware devices and software techniques available in the U.S. Fortunately, publications such as yours are available to help fill the information gap. Most of your articles are well written, informative and accurate. However, we'd like to call your attention to one that isn't.

In the April 24 edition, *Computerworld* ran an article by Thomas Jaycox entitled "Right-Left Language Scanned 'by Number.'" At best, Jaycox is grossly uninformed.

We are currently employed as consultants to the Plan and Budget Organization of Iran. In this capacity, we and our Iranian coworkers are directly involved in reviewing and studying many computer system development projects funded by the government, such as Jaycox's. Therefore we are in a position to spot the many fallacies in his article.

However, since there are too many errors and inaccuracies for us to mention them all, we will confine ourselves to the most glaring.

First, we have no problem at all with preparing computerized systems in the national language, Farsi, even though it does read right to left, as Jaycox stated. The vast majority of computer hardware vendors in Iran have Farsi printers and CRTs available. We're surprised by Jaycox's statement that the latter "right now are still in the text and checking stages." We have been using several hundred Farsi CRTs with our on-line systems for more than four years. This includes the IBM 3270 line.

As for data entry in Farsi, there are numerous vendors and devices available. We use not only the standard IBM Farsi keypunch, but also a Control Data Corp. 970-2 with Farsi data entry terminals.

Finally, Jaycox was dead wrong when he said such things as there are "less than 100 computer installations" or that "most systems developed in Iran . . . process English data only . . ." In both cases, the opposite is true.

Perhaps Jaycox is limited by the type of hardware and software available to him, but to publish these limitations as generalizations for the whole country of Iran is not only misleading to those who may wish to do business here, but an injustice to the host country as well.

Jack A. Beyer
Mark H. Wallace

Teheran, Iran

About Bill-Paying System

"Pay-by-Phone Service To Cover Two-State Area" [CW, May 8] credited the southern Ohio and northern Kentucky "Pay-by-Phone system" which will be implemented in July with being the "first multiple savings and loan system in the country."

I would like to point out that a shared bill-paying system, developed by TMS Corp. of Lincoln, Neb., was launched in November 1977 under the Money Service name. The service is currently shared by First Federal Lincoln, Nebraska State Savings, Equitable Savings, Falls City Federal Savings, The Martell State Bank, Citizens State Bank and Offutt Federal Credit Union. The Money Service bill-paying system is the first of its kind to employ a statewide merchant and branch network in addition to telephone bill paying.

The telephone portion of the Nebraska bill-paying system is built around voice-activated recording equipment which records and stores all telephone bill payments. Such equipment allows 24-hour bill-paying services to be offered.

The article further stated that "the system [Pay-by-Phone] differs from other telephone banking services in that a Pay-by-Phone customer is not restricted to using a Touch-Tone phone." Although many telephone bill-paying systems offer the option of directly transmitting information into the computer via Touch-Tone phones, very few systems are "restricted" to using a Touch-Tone phone. The Nebraska system for example, uses the voice-activated recorder to compensate for the relatively low percentage of Touch-Tone phones in the market area.

TMS Corp. has packaged this bill-paying system and is currently marketing it nationwide.

Kelly Coffey
Advertising/-
Marketing Department

TMS Corp.
Lincoln, Neb.

Letters to the Editor

Tired Stowaway Text

Reference "GM Program Rates Level of Text Difficulty" [CW, May 1]. How much text does it take to describe the benefits of stowing a deflated tire? The first example had 36 words and the second example had 22 words. I would like to offer the following statement. "Stowaway spares are stored deflated. This allows more storage space."

Note the flat statement, "Stowaway spares are stored deflated". This assumes one has a car or vehicle in which to stow the spare tire. Then, for those who don't realize that the deflated tire is going to be smaller, I have added the second statement, "This allows more storage space."

Roger Anderson

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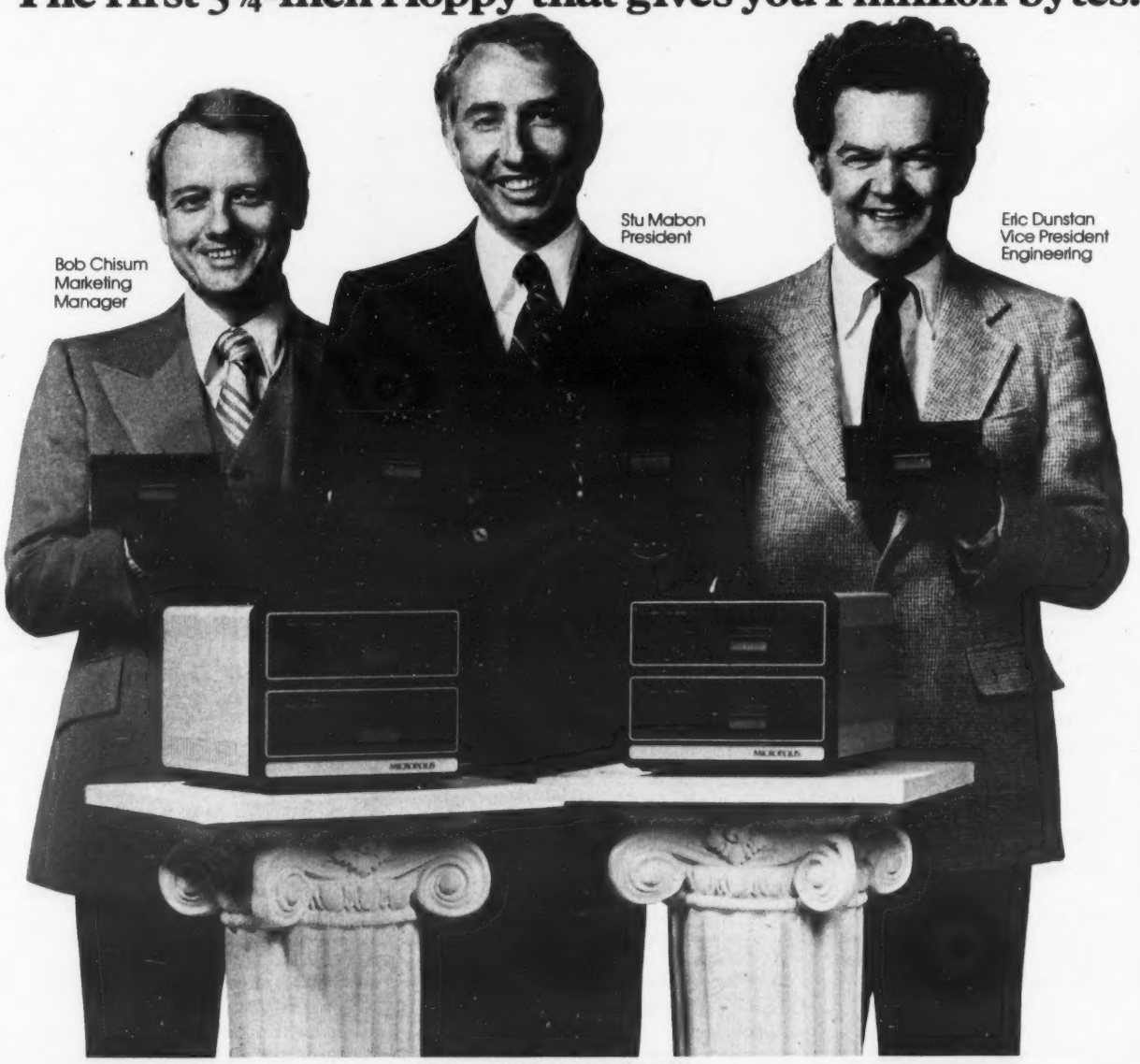

"See us at NCC booth #4443"

One DBMS Standard Insufficient for Users

(Continued from Page 49)

grammers and end users on the various data structures.

If a particular data model is implied by a DBMS standard, the required or preferred use of a different data model may be precluded. For these reasons, if not for many others, multiple standards will be required.

Even within a single data model, unique end-user and application requirements call for multiple-language facilities for the same DBMS.

Codasyl Specifications

The specifications for DBMS languages for data definition and data manipulation developed by the Codasyl task force and its successors have been considered by standards bodies for a number of years. The specifications were defined in the 1969-1970 time period and have received only minor revisions since then.

The entire thrust of the creators of the specifications was to produce a data structure and access language for programmers. No language specifications for users of the data were provided.

This was a conscious decision of the task group. It has become clear since that time that direct end-user access to the data is extremely important.

Major objections to the adoption of the Dodasyl specifications as standards have been voiced. An American National Standards Institute (Ansi) study group looking at the data manipulation language (DML) agreed changes to the specifications were essential, but the group was so divided on what and how much change was required that it went so far as to recommend that a major turnover in the membership of the study group take place.

Indeed, the entire history of the Codasyl data base task force specifications has been one in which emotional and proprietary interests have often overshadowed the technical and economic aspects of the case.

Pride of authorship has, unfortunately, closed minds and formed factions. What may have started out as an earnest attempt to seek the best way to deal with data bases has evolved into a struggle between vested interests.

There are people today who prefer not to confront the serious shortcomings of the Codasyl approach as an accomplished fact with no further need for justification.

Acceptance of an idea is often a snowball-turned-avalanche since, as more people embrace an idea, it becomes easier to justify further acceptance on the basis of widespread popularity. At some point, the snowball begins to roll fast enough to no longer require the impetus of technical justification. The often-misspoken phrase, "Codasyl standard" rather than "specification," illustrates this situation.

There will always be the argument for standardization, just as there will always be the desire to wait for the next generation. Data base management is now emerging as a proper discipline of computer science rather than an ad hoc craft.

Systems are being proposed which are based on cohesive theoretical foundations. The relational systems now being explored have as a basis the mathematical theory of the relational calculus.

Having such a foundation gives strong and useful guidance to the designer and implementors of systems so that their end product is logically sound. Similarly, MRI System Corp.'s System 2000's selection mechanism (the "where" clause) rests on sound mathematical theory. The Codasyl specifications have no such basis.

Low-Level DML

It has been argued that the Cobol DML of Codasyl was intentionally designed as a very low-level language and, because it is functionally complete, any generalized higher level function could be built up by writing subroutines or macros which use the low-level elements. There is a problem with this mode of thinking.

These combinations of low-level commands are dependent on having the proper supporting data structures included in the schema and the subschemata. For example, SETs may be defined which carry no information but only govern retrieval order, or LOCATION modes may not be defined, prohibiting the use of certain FIND command formats.

In other words, the DML syntax and semantics of a given program are dependent on structures defined at schema generation time. In doing so, a large measure of data independence has been lost.

It is entirely too probable that the data base administrator will discover that certain structures defined by the data definition language (DDL) are needed that were not included in the schema. By that time, he may already be locked into a data base and application design.

The purpose of a DML (even a DML embedded in a programming language) is to provide a high-level application interface and to retrieve the programmer from the necessity of reinventing the wheel each time a commonly used high-level function is needed. Certain functions are best incorporated into the basic DML because they are more efficiently handled by the data management software rather than the application software. The DBMS has access to resources, such as storage structure elements, which are not directly available to the application programmer.

The Codasyl DML constrains the system from being able to take full advantage of this information. Being a navigationally oriented system, the application program is confined to move record by record through the data structure.

To find a subset of a collection of records, each record has to be retrieved and transferred from the DBMS to the application program. This greatly increases interprogram or perhaps interregion or even interprocessor traffic, adding an unnecessary burden to the system.

No DML function other than ORDER uses sets of records as its operands or output. No Boolean operators are provided and no conditional operators other than equality are provided.

Thus, a navigational system of the Codasyl type relies on the application program to perform operations which could be more efficiently performed internal to the DBMS.

The DML is sensitive to factors defined in the schema, e.g., LOCATION MODE....Adding to or changing the schema so that additional addressability is available does not automatically enhance the efficiency of running application programs.

To gain these efficiencies, the program must be rewritten. The program is very sensitive to the schema definition.

Without a high-level DML available, the productivity of the personnel associated with the application will suffer, as I have stressed before [CW, Jan. 9]. Productivity aids such as prototyping capability, program independence and program readability (to ease disruption because of staff turnover) can be lost or decreased when a high-level language is not used.

Thus, it is quite clear that the Codasyl specifications are far from the ideal choice for a standard.

Parsons is assistant to the executive vice-president of MRI Systems Corp.

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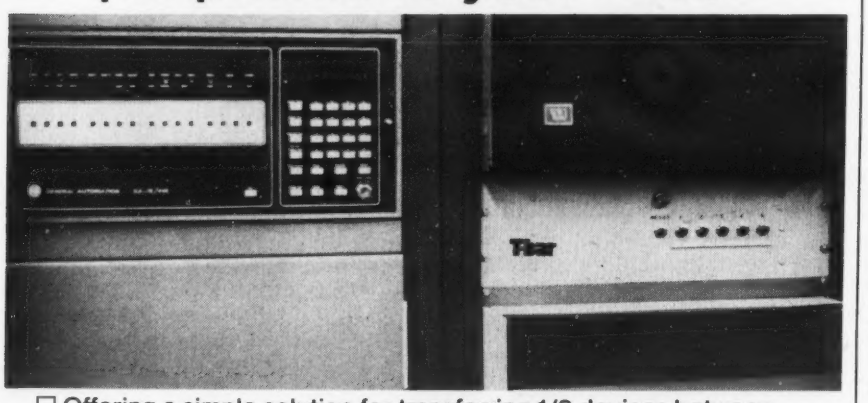

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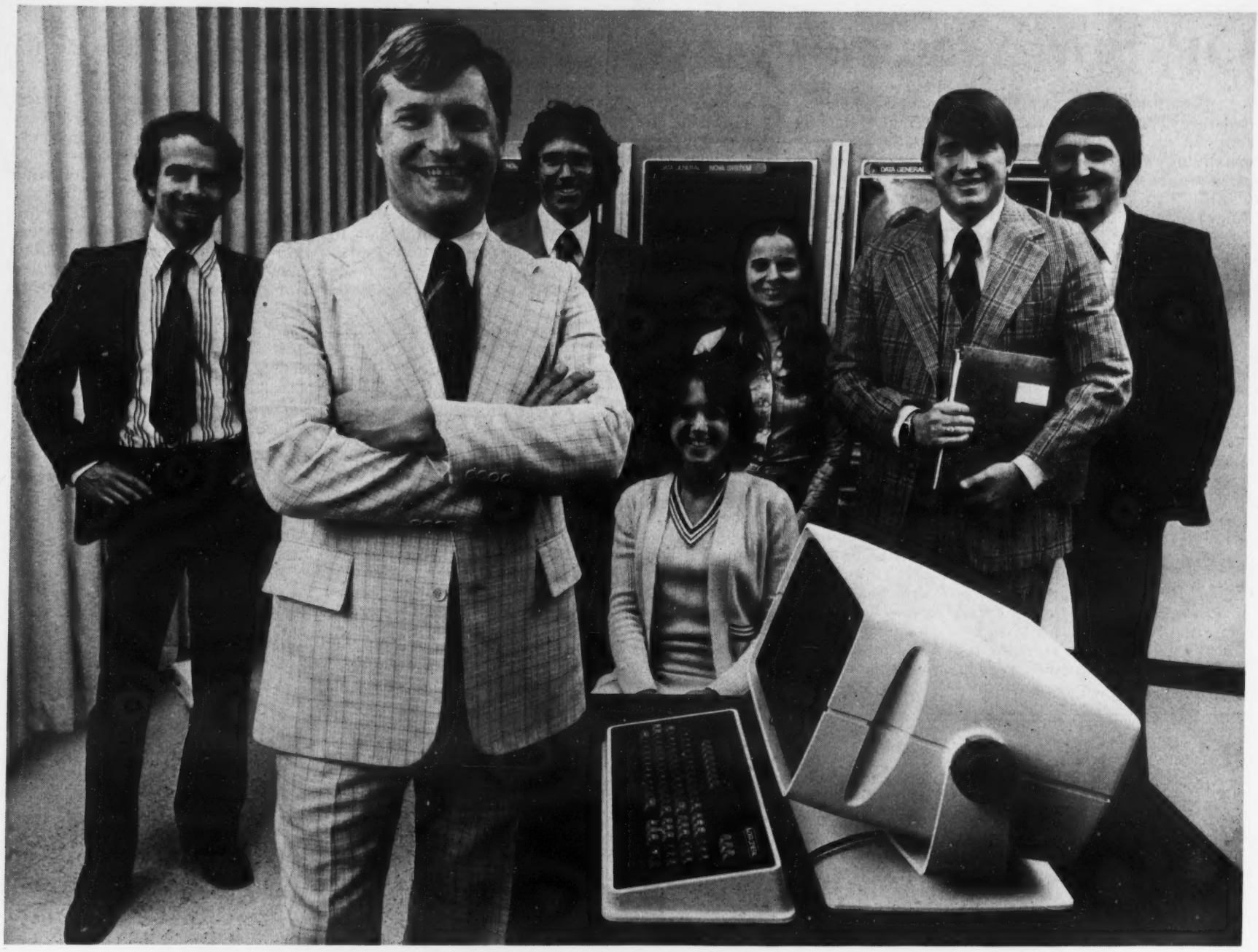

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DP, Bureaucracies Have Much in Common

(Continued from Page 47)

response when asked what is the cause of problems or delays. It is usually one of the following: "The programmer misplaced a decimal point." "The automatic whiz-bang dingus is down." "The operator mistyped a command." "The power source is fluctuating."

Regardless of the response given, they all lend credence to Parkinson's Law as fundamental to the operation of a computer. Whenever such detached considerations can have major consequences, a disproportionate amount of effort is expended to prevent the malfunctions which occur anyway.

Consequently, the placement of decimal points and the coddling of hardware components take on greater importance than the performance of the task at hand — the solution of a problem using a computer.

• Computers are justified and installed for specific purposes. Very few are actually "window dressing," despite editorials to the contrary. They, like bureaucracies, are established to meet pressing needs.

Needs often change over time, however, leaving "dangling" computers struggling to maintain an identity and purpose when they are no longer needed. They generate a workload for themselves. There are time and cost reports to show how efficiently the computer is being used, scheduling reports to promote efficient use of the computer, personnel reports to report the workload of computing pesonnel.

• Full productivity is a goal of both bureaucracies and computers. No idle hands are permitted; everyone must at least look busy.

The computer is constantly being put to work doing inconsequential tasks in order to reflect full utilization on time and cost reports. Idle computers are a sign of ineffective planning.

• The Peter Principle persists in the computer system. It seems in line with the full-utilization emphasis: bigger and bigger systems are required to handle more and varied tasks.

In its initial form, a computer may have been designed to do its primary task well. As it is expanded (promoted) to greater and varied tasks, it does more things with less quality until eventually it does everything in a mediocre fashion.

I am sure perceptive individuals could extend this list considerably. However, further examples are unnecessary to underline the observation that computer centers are bureaucracies — from the people who run the centers to the machines that run the people.

Miller is a consultant to the California State Senate Committee on Rules.

Sears Deflates Customers' Savings

(Continued from Page 47)

from a billing date. Thirty days from Feb. 6 being March 8, there should be no conclusion of any past-due amount having occurred on March 6; the amount simply wasn't due. So we know the program used by Sears covering the end of February did not include the 30-day check. That means it did not include the contractual requirement, instead using some other one. What was that other test it used?

It is quite clear, from the way the billing dates are shown, the program uses the day of the month (in this case the sixth day of the month). This is not indicated, and I don't think in the case of February it is even legal, although I leave that to the Federal Trade Commission to look at. It is certainly wrong professionally, which is as far as I care to go.

Moreover, the April statement shows that this mistake (sorry, not mistake, but rip-off) was not being cleared up. When the March 8 payment was booked within the 30 days, it might have been possible for the 50-cent charge to be lifted from the account. It would have even been possible for Sears to have sent an apology for the accusation of past due amounts, or even to have intervened to stop the incorrect February statement.

However, Sears took none of these needed actions. The April statement shows this. By now, the system has the finance charge hidden in a "previous balance" copied from the previous false one.

The consistency with which such computerized rip-offs are coming up is important from the professional point of view. Through these, most people receive their main information about computers.

At the moment, the message they receive is that where possible, ordinary people will be tricked. Further, where possible, the tricks will be smoothly hidden in a nice, subtle, computer-oriented manner. Not a very good public relations operation for our profession, is it?

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Mo	Day	Reference	TRANSACTION DESCRIPTION	CHARGES	PAYMENTS & CREDITS
01	30	UCJD	AUTOMOTIVE ACCESSORIES 28 GASOLINE, AUTO SERVICE AND REPAIRS	26.42	
01	31	8898	PAYMENT		2.89

PLEASE MENTION THIS ACCOUNT NUMBER WHEN ORDERING OR WRITING.	BILLING DATE	PREVIOUS BALANCE	NEW BALANCE	MINIMUM PAYMENT
64 80064 50121 4	FEB 06 1978	2.89	26.42	10.00

If the *FINANCE CHARGE* exceeds 50¢, the *ANNUAL PERCENTAGE RATE* is 18% on the first $700 of the AVERAGE DAILY BALANCE and 12% on that part of the AVERAGE DAILY BALANCE in excess of $700. The AVERAGE DAILY BALANCE excludes any purchases added during the monthly billing period and any unpaid *FINANCE CHARGE*.

To avoid a *FINANCE CHARGE* next month, pay this amount within 30 days from Billing Date.

If you prefer to pay in installments, pay this amount or more within 30 days from Billing Date. The sooner you pay and the more you pay, the smaller your *FINANCE CHARGE*.

14361-824 Rev. 7/15/77 NOTICE: SEE REVERSE SIDE FOR IMPORTANT INFORMATION.

In case of a billing error, *MAIL BILLING ERROR NOTICE TO* Sears at address below. Direct all other inquiries to nearest Sears store.

TERRILL RD. + RT.22 WATCHUNG, NJ 07060

Mo	Day	Reference	TRANSACTION DESCRIPTION	CHARGES	PAYMENTS & CREDITS
			FINANCE CHARGE ON AVG DAILY BAL OF $26.42	.50	
02	11	WJPS	AUTOMOTIVE ACCESSORIES 28	41.99	

THE AMOUNT DUE SHOWN ABOVE INCLUDES A PAST DUE AMOUNT. YOU SHOULD SEND THE ENTIRE INSTALLMENT PAYMENT NOW. IF PAYMENT HAS BEEN MADE RECENTLY, PLEASE DISREGARD THIS REQUEST.

PLEASE MENTION THIS ACCOUNT NUMBER WHEN ORDERING OR WRITING.	BILLING DATE	PREVIOUS BALANCE	NEW BALANCE	MINIMUM PAYMENT
64 80064 50121 4	MAR 06 1978	26.42	68.91	20.00

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Mo	Day	Reference	TRANSACTION DESCRIPTION	CHARGES	PAYMENTS & CREDITS
03	08	9228	PAYMENT		26.42
03	29	UCDL	WOMENS BUDGET APPAREL/ACCESSORIES 27	5.49	
04	01	UC8E	AUTOMOTIVE ACCESSORIES 28	21.47	
04	04	4224	PAYMENT		41.99

PLEASE MENTION THIS ACCOUNT NUMBER WHEN ORDERING OR WRITING.	BILLING DATE	PREVIOUS BALANCE	NEW BALANCE	MINIMUM PAYMENT
64 80064 50121 4	APR 05 1978	68.91	27.46	.00

If the *FINANCE CHARGE* exceeds 50¢, the *ANNUAL PERCENTAGE RATE* is 18% on the first $700 of the AVERAGE DAILY BALANCE and 12% on that part of the AVERAGE DAILY BALANCE in excess of $700. The AVERAGE DAILY BALANCE excludes any purchases added during the monthly billing period and any unpaid *FINANCE CHARGE*.

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Comparison of Sears billing program output for three consecutive months shows that it is not using the 30-day finance period.

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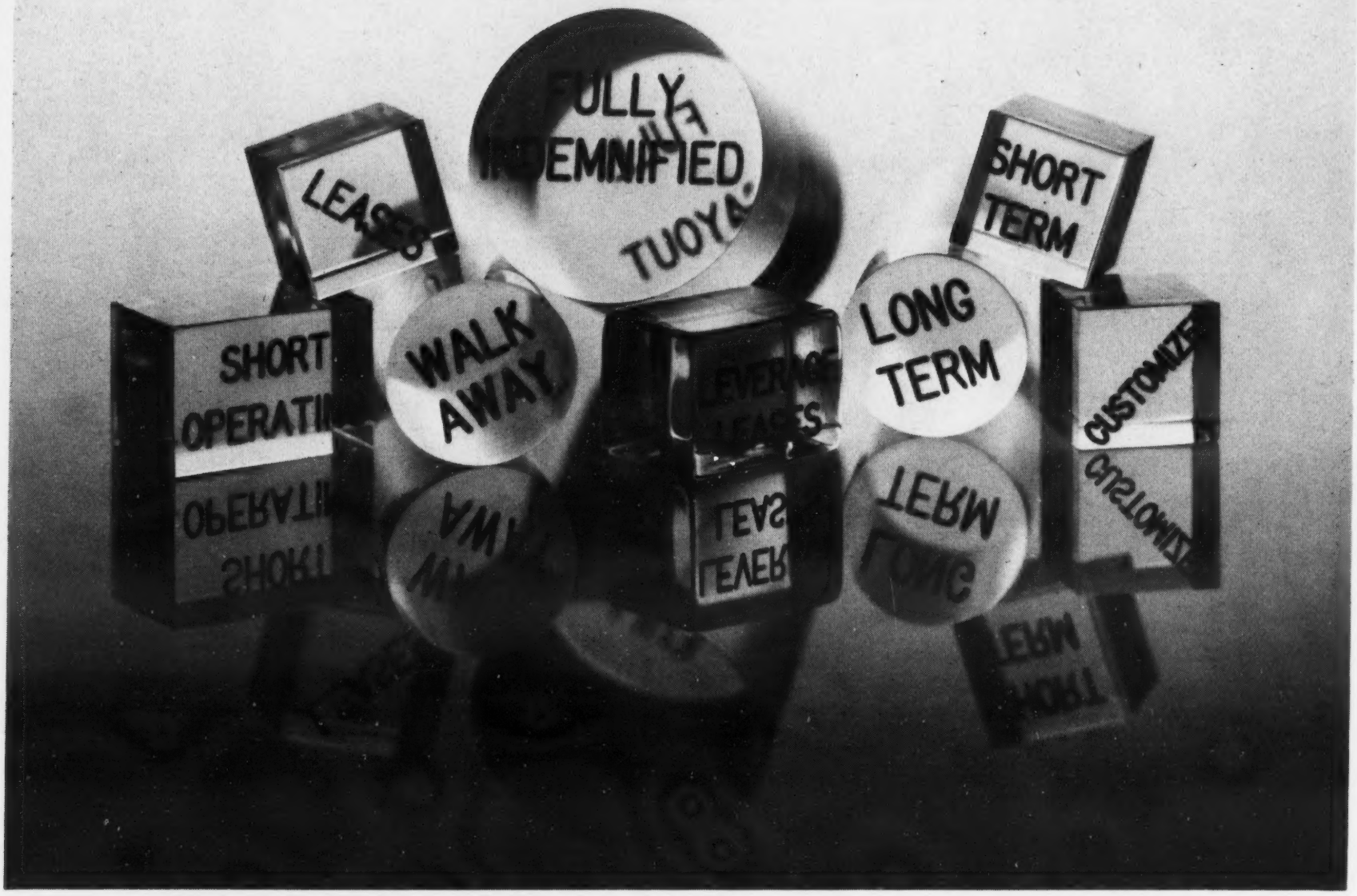

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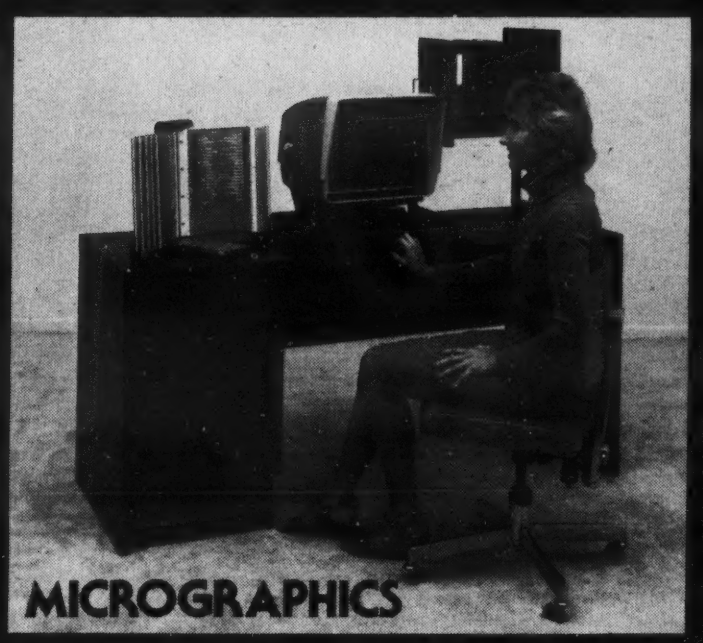

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Trusco 'Compress' Replaces 'IEBCopy'

ATLANTA — The TDS Quick Compress package from Trusco Data Systems was designed and written as a high-performance replacement program for the Compress-in-Place function of the IBM-supported utility IEBCopy, according to a spokesman.

The Trusco package was developed to run in an IBM MVS environment, but can be run in OS/360, VS1 and SVS environments if there is sufficient region storage and the CPU utilizes the IBM 370 instruction set, the spokesman said.

TDS Quick Compress generally runs in about one-fifth the wall clock time and one-fourth the CPU time needed by IEBCopy, and it usually requires one-tenth the EXCP count of the IBM utility, he claimed. Comparative timings between the two software routines will vary, he acknowledged, and this is generally a function of block size.

In any case, operational efficiency isn't necessarily the most important benefit to be gained from the independent's package, the spokesman noted. There is no reset function in IEBCopy, he said, and the availability of this feature in TDS Quick Compress can save an installation "considerable" time in scratching members and compressing.

In operation, the package requires no special SVCs, no special I/O appendages, no "authorization required" and no V=R considerations, he continued.

The utility runs as a standard batch job.

It doesn't generate any ambiguous messages or trigger termination of the compress on minor errors, he said. The program "makes every effort to describe any error encountered and continue the compress."

An internal trace routine and "Snap" dump routines are provided to furnish additional information in the event of problems with the partitioned data sets (PDS) or the user program.

The program was designed to avoid unnecessary paging, he claimed; any unsatisfied request for storage will result in a message to the user advising how much additional space is needed.

The amount of storage required by the product depends on device type, number of directory blocks in use and number of PDS members and aliases. For MVS users, a rule of thumb is to use a 1M-byte region for IBM 3330-type devices and 1.5M bytes for 3350s, he said.

TDS Quick Compress is delivered in object form on a 9-track, 1,600 bit/in. magnetic tape; the one-time license fee is $4,000. The package is available from Trusco, P.O. Drawer 4418, Atlanta, Ga. 30302.

'Doris' Handles Text In DG's RDOS Setting

VANCOUVER, B.C. — Doris is a document formatter designed for the production of printed output such as letters, manuals and reports. It is, according to Finning Computer Services Ltd., a convenient solution to the documentation problem faced by every DP organization.

Utilizing any Data General Corp. Eclipse or Nova family processor running under RDOS, Doris uses a source text file that consists of raw text interspersed with one-word format instructions and that may be created using "any suitable method such as the DG text-editing programs," a spokesman said.

Output from Doris may be in upper and lower case type and may be directed to a line printer or a disk file for subsequent printing, he added.

Features supported by Doris are said to include line justification, page numbering, title centering, margin adjustment and page headings and footings. A slew test for sufficient lines on a page, support for leaving blank pages, showing revision numbers and defining line spacing are also part of the system, the spokesman said.

The package requires any DG or compatible system running under RDOS. Doris is available under license for $1,500 and is distributed on 800 bit/in. magnetic tape.

Program maintenance, including new revisions of the software, is included during the first year and is available for a fee after that, the company noted from 555 Great Northern Way, Vancouver, B.C. V5T 1E2, Canada.

System, Program Plans Maintained by Package

TOPEKA, Kan. — The systems development and documentation package called Structure(s) from Langston Kitch and Associates, Inc. is intended primarily to help designers, analysts and programmers document and maintain existing IBM 360/370 programs and systems easily, according to a spokesman.

It also supports development right from the beginning, he added, noting that high-level designs can be entered into the system from the first day of development work. As new pieces of the system take shape, they are consistently integrated into the system and a new set of formatted, cross-referenced documents is generated.

This degree of support frees the designer from the chore of daily maintenance of a working design and allows him to pay more attention to his basic goal: the design of a logically correct and functional system, the spokesman claimed.

Heart of the Structure(s) package is what the developer calls a document handler. It assembles and draws Warnier-Orr diagrams on a line printer. These diagrams can represent designs of systems or programs or of data base structures, he explained.

The hierarchical nature of the Warnier-Orr diagrams make them easy to read and understand, he said, and their "unique clarity" improves communications "radically" at all levels, from the programmer to the end user.

Because the Warnier-Orr diagrams have been utilized during development, users feel comfortable with them and with the standardization they bring to the installation's methodology. This makes it much easier to maintain existing systems than when the maintenance programmer has to first try to determine what, if any, documentation exists.

Structure(s) is a batch-oriented system written in Cobol and currently available for IBM 360 and 370 installations. The package may be interfaced with any of the popular source library systems in use on these systems, he added.

Maximum partition size varies with user requirements but is generally around 180K bytes, he estimated. The package is available now for $4,900.

Lease and monthly rental plans are also available, the company noted from 715 E. 8th St., Topeka, Kan. 66607.

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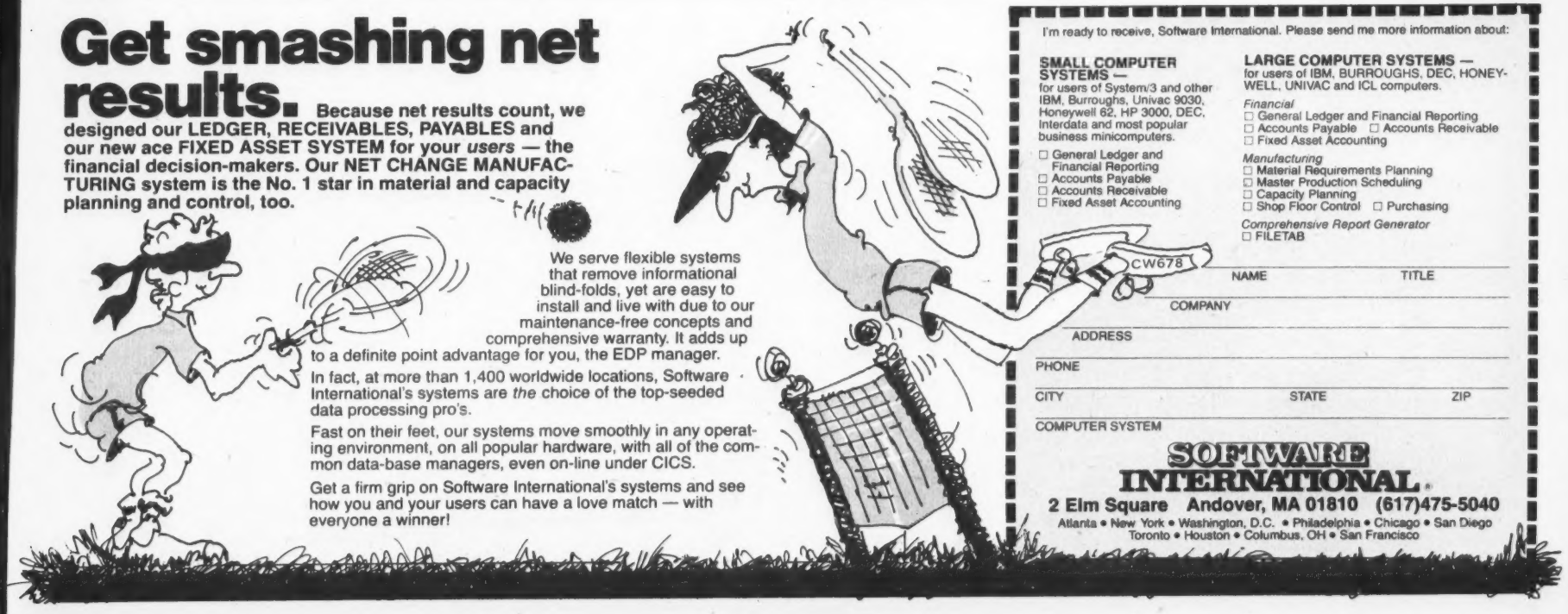

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HIS Modules Tie Level 6 to IBM-Like Systems

WALTHAM, Mass. — The multifunctional capabilities of the Level 6 minicomputers from Honeywell Information Systems, Inc. have been extended with the introduction by the vendor of additional software.

Two modules include programs that enable a Level 6 to function concurrently with a variety of IBM-compatible host CPUs as a Hasp workstation or 2780/3780 remote batch terminal, a spokesman said.

In addition, Level 6 users can acquire Henco, Inc.'s Info 6 file inquiry and update system directly from HIS under terms of an agreement signed recently by the two vendors.

Both Info 6 and the other two modules are compatible with the Gcos 6 operating software announced last October, the spokesman noted.

The Level 6 Hasp workstation facility and the 2780/3780 remote batch terminal facility allow users to transfer data between a Level 6 and a number of host processors without any changes in the host system's software, he claimed.

The capabilities can be used at the same time as other facilities previously available for the Level 6, he said.

Info 6 is a conversational data inquiry/update system. Using English-language commands, users can perform normal DP functions without resorting to conventional programming techniques, according to HIS.

The system can provide a sophisticated report with a limited series of steps and supports access to any Level 6 file through a file manager, the spokesman said. Info 6 runs as an application under the Level 6 Gcos 6 Model 400 operating system and may be executed concurrently with other applications.

License fees for these software modules are $2,200 for Hasp, $1,640 for the 2780/3780 remote batch terminal module and $3,800 for Info 6. The two communications modules will be available in the third quarter. Info 6 is available now.

'FTL' Manages Transients Put in DOS/VS Memory

COLUMBUS, Ohio — The Fast Transient Loader (FTL) utility from Goal Systems Corp. is said to allow DOS/-VS-oriented installations to place B transients and CRT transients in main memory.

By supporting that placement, the package reduces contention of the system residence disk volume and the transient areas are freed more quickly, a spokesman explained. Overall throughput can be increased "significantly," he claimed.

For example, he said, when the CRT transients are placed in main storage, the 125D or 3277 system console will output messages at rates three to five times faster than under normal DOS/-VS.

Full statistics are kept by FTL on transient usage and a separate monitor function is incorporated to provide the information needed to fine-tune the system. FTL can be installed without any modification of DOS/VS and does not require a reloading operation to become functional, the vendor said.

In the U.S., FTL can be leased for $50/mo.

Goal Systems Corp. can be reached through P.O. Box 29481, Columbus, Ohio 43229.

Correction

The proper address for the vendor of the Telecommunications Program Generator [" 'TPG' Eases System/3 Work," CW, May 22] is Granat Data Corp., 1456 Peters Blvd., Bayshore, N.Y. 11706.

Service Backs APL Switches

NEW YORK — Aplications, Inc. is now providing a conversion support service for installations involved in moving APL programs from time-sharing services to in-house facilities.

The Aplications service includes use of specialized analysis programs that assist in converting many of the proprietary enhancements used on a network vendor's system to the correct code for the user's in-house environment. Additionally supplied is APL training for the in-house staff and users, a spokesman said.

Custom systems planning and programming are also available.

The complete service costs $325/day, he said from Suite 301, 400 Madison Ave., New York, N.Y. 10017.

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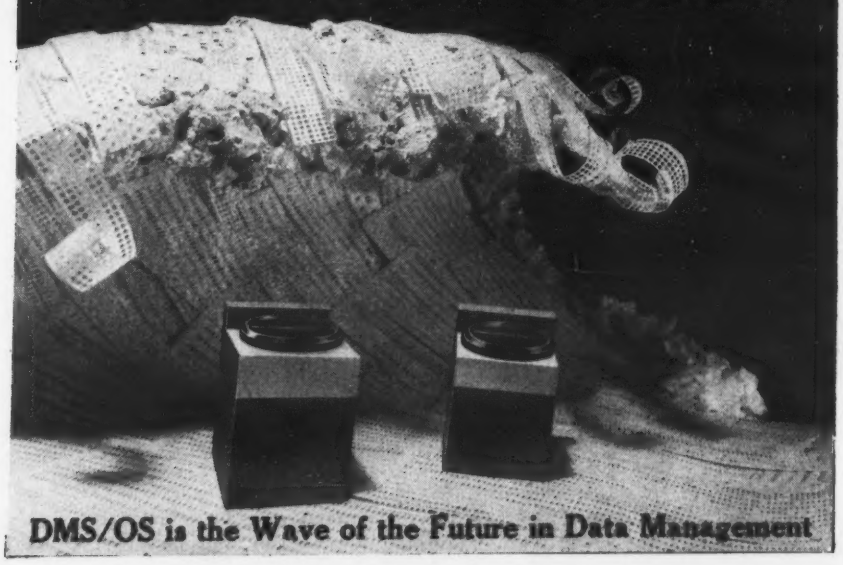

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'XALC' Eases Management, Coding of Assembler Work

BETHESDA, Md. — The Extended Assembler Language Coding (XALC) package now available from U.S. Robots, Inc. has been described as an IBM Assembler language programmer's toolbox. It is a library of macro-instructions and macro-controlled subroutines that supplement and extend the OS 360/370 Assembler language, a spokesman explained.

Benefits to be gained by using XALC are lower programming costs, improved software reliability and better management of programming projects, he claimed. The package enables the programmer to code applications more quickly than possible under either conventional Assembler or Cobol, he continued.

"Certain error-introducing features" — not otherwise defined — "found in other languages" are said to have been eliminated or diminished in XALC. The package includes a patching facility that reportedly allows quick fixes during debugging so tests can continue without recompilation.

No GOTOs

Reliability is improved, the spokesman asserted, since XALC promotes GOTO-less coding using simplified methods of subroutine calls and the IF ... THEN ... ELSE logic statements in XALC.

The library of routines also frees the programmer from having to code all the register storage, "save area" handling, calling linkage and parameter parsing that usually mark Assembler programs — and often leads to problems if not done properly, the spokesman said.

Management should like the control provided by XALC, the spokesman continued. It reinforces more formal and correct interface methods among components, modular design of systems and programs and the establishment of standards and conventions among project members, he claimed.

XALC is available on a perpetual lease for $7,000 plus a 10% annual maintenance fee after the first year. A reference manual is provided in hard copy and in machine-readable form on the delivery tape.

U.S. Robots is at 4901 Fairmont Ave., Bethesda, Md. 20014.

Service Provides Articles

SPRINGFIELD, Va. — The National Technical Information Service (NTIS) has introduced the Journal Article Copy Service (Jacs) to provide users with rapid access to articles from more than 5,000 scientific and technical journals from a single source.

Under Jacs, the user scans a directory published by NTIS to determine if a desired journal issue and article is available through the service. Jacs is said to cover most technical and scientific fields, listing journals by title.

Orders for specific literature can be transmited by TWX, Telex or dial-up terminals. They will also be accepted over a special toll-free "800" number telephone at a small extra charge, a spokesman added.

NTIS does not stock the journals and articles for filling Jacs orders, but does relay orders electronically to an appropriate fulfillment source which might be a library, information service or publisher.

Once the fulfillment source gets the order, the article copy will be mailed to the requester within two days, NTIS said.

The articles supplied through Jacs not only reach the user quickly, but without any concern about copyright violations and royalty fees for the requester. NTIS pays any royalties that are required.

Cost per article is about $6, the spokesman said from 5285 Port Royal Road, Springfield, Va. 22161.

PDP-11 Sites Offered Fortran Subroutines

HOUSTON — International Mathematical and Statistical Libraries (IMSL) has implemented the IMSL Library on the Digital Equipment Corp.'s PDP-11. These mathematical and statistical subroutines are used as building blocks for scientific and engineering application programming.

Testing was performed on DEC's Fortran IV and Fortran IV Plus compilers. Since the software is independent of the operating system, it is accessible to most users, IMSL noted.

A tape drive is needed for loading the source code provided. Typical utilization requires 32K words of main memory.

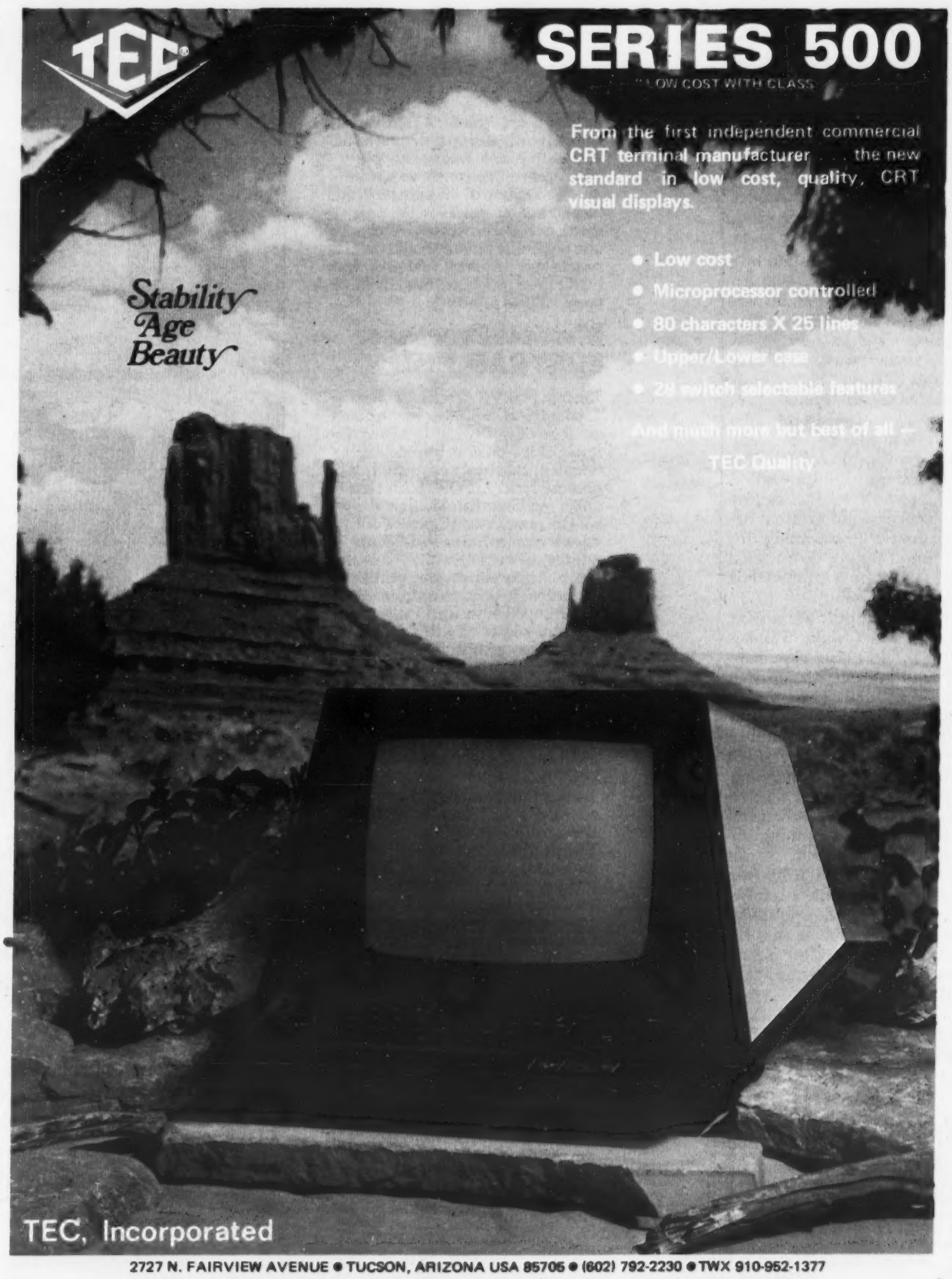
An IMSL subscription costs $1,220/year with educational institutions and multiyear subscribers receiving discounts. IMSL is on the Sixth Floor, GNB Building, 7500 Bellaire Blvd., Houston, Texas 77036.

Basic/Four Monitors Electrical Contracts

BEAUMONT, Calif. — An electrical contractor's estimating and job-cost analysis package written in Business Basic for the Basic/Four Corp. small business system is available from Computer Applications Development Associates.

Supporting up to four terminals, the package is said to produce reports similar to National Electrical Contractors Association forms.

The software costs $9,000 and can be ordered through P.O. Box 624, Beaumont, Calif. 92223.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UCS Enhances 'Ansys' for Engineers

KANSAS CITY, Mo. — United Computing Systems, Inc. (UCS) has added an enhanced version of Ansys, a finite element program for large-scale engineering analysis, to the program library available on the company's remote computing network.

Developed by Swanson Analysis Systems and in use since 1970, Ansys is applied to production analysis for structural, nuclear, mining, chemical and automotive engineering work. Ansys Revision 3 is said to include improved elements, expanded analysis capabilities and new input, output and graphics techniques.

Interactive plotting, choice of coordinate systems and interactive or batch modes of input are some of the enhancements in the update. So are element reordering for wave front optimization and "extensive" preprocessor capabilities including mesh and boundary condition generation and piping conversion, according to a spokesman.

Ansys generation of geometry plots now allows interactive plotting coordinate axes and three-dimensional section plots to further enhance the program's graphical output, he added. It provides options for full and reduced dynamic analysis and offers a large element library including planer, beams and three-dimensional solids, he added.

United's Uninet international data communications network connects more than 150 cities in the U.S., Canada and Europe with major data centers in Boston, Mass.; London, England; and here in Kansas City.

UCS is headquartered at 2525 Washington, Kansas City, Mo. 64108.

HIS 66/07 In

WOODBURY, N.Y. — "Practically no conversion" will be required by users as they move their workload from a Honeywell Information Systems, Inc. H635 to an H66/07, which is replacing the older equipment at Calldata Systems, Inc.'s data center in Newton, Mass., a spokesman said from 20 Crossways Park North, Woodbury, N.Y. 11797.

'TMX' Puts Transactions Under RSX

CAMBRIDGE, Mass. — The Transaction Management Executive (TMX-11) from TMI Systems Corp. handles the resources of a Digital Equipment Corp. PDP-11 to enhance the RSX-11M operating system for use in a transaction processing environment, a spokesman said.

The design of TMX-11 is said to be geared toward applications operating on-line in a high-volume, time-critical environment with multiple terminals (usually CRTs) performing data entry and inquiry tasks. Heavy data base use and CPU-to-CPU communications are also typical characteristics of TMX-11, the spokesman added.

The package includes buffer management, transaction queuing, task scheduling, error reporting and external device interface, providing for the emulation of a buffered CRT when using DEC's VT52 terminals, he said.

TMX-11 supports both DEC files-11 and Cincom Systems Inc.'s Total 11 data base management systems. Capabilities added through TMX-11 include multirecord and file locking as well as elimination of data movement by using dynamic memory mapping, the vendor noted.

TMX-11 requires 64K memory on a PDP-11 running under RSX-11M. It costs $40,000 for the first CPU with lease arrangements available. Discounts are also available for multiple CPU usage, the vendor said from One Broadway, Cambridge, Mass. 02142.

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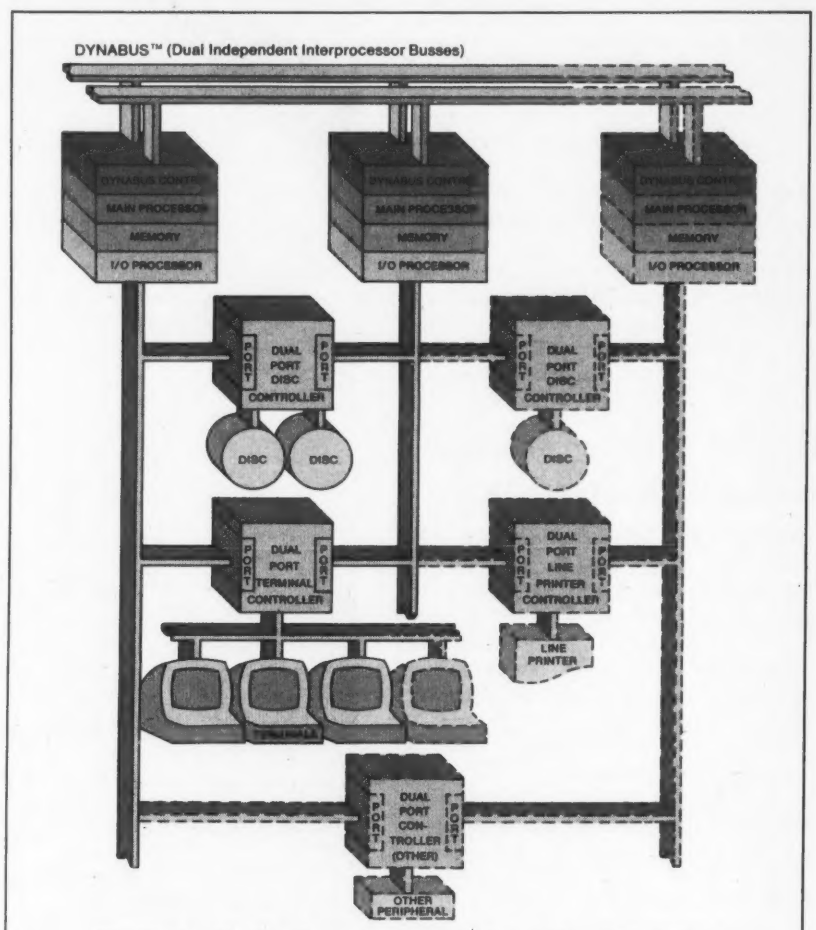

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To End Users and Programmers

Relational Data Bases Not Very Appealing Now

By Stephen L. Robinson
Special to CW

In addition to the recent letters about Codasyl vs. non-Codasyl data base management systems, the reader commentaries by Larry Towner and myself have produced several requests for our views on relational data base systems.

One such request, from W.C. Meilander of Goodyear Aerospace, included the following throught: "Ideally these comments would address the relational data base concept only and ignore the present state of hardware/software implementation."

Data Base Corner

That is, unfortunately, a bit difficult to do. It's like talking about the concept of an electric car while ignoring the limitations of today's technology.

For example, the JOIN operator is basic to the logical operation of a relational data base system. The physical implementation of a *dynamic* joining of relations (as opposed to the *static* establishment and maintenance of interfile relationships) is impractical today. The development of associative memories would change this situation rather markedly

I will try, however, to discuss relational data bases with minimal attention to the limitations of today's computer mainframes. Rather than repeat the basics of relational data base systems, I would direct the interested reader to the article by C.J. Date entitled "Relational Data Base Concepts" in the April issue of *Datamation*, to Date's book, *An Introduction to Data Base Systems*, or to James Martin's book *Principles of Data Base Management*.

It is important to recognize, from the outset, that the relational data base concept, like the Codasyl concept, represents a logical (as opposed to physical) view of data constructs and operations.

I would like to discuss the relational concept from three points of view: that of an end user (non-DP person), that of an application programmer/-analyst and that of a data administrator. In what follows, it should be noted that I have not had occasion to work with an implementation of a relational system, nor have I talked extensively with people using such a system (there being few such people).

I have, however, studied the relational concept, have explored the mapping of such concepts onto various data base packages and have analyzed the trade-offs inherent in physical implementations of various normal forms.

End User View

At the present time, the vendors of the major data base packages are involved in a minor competition to produce the most English-like, user-oriented query languages and report writers. At stake is a large portion of the expanding data base marketplace.

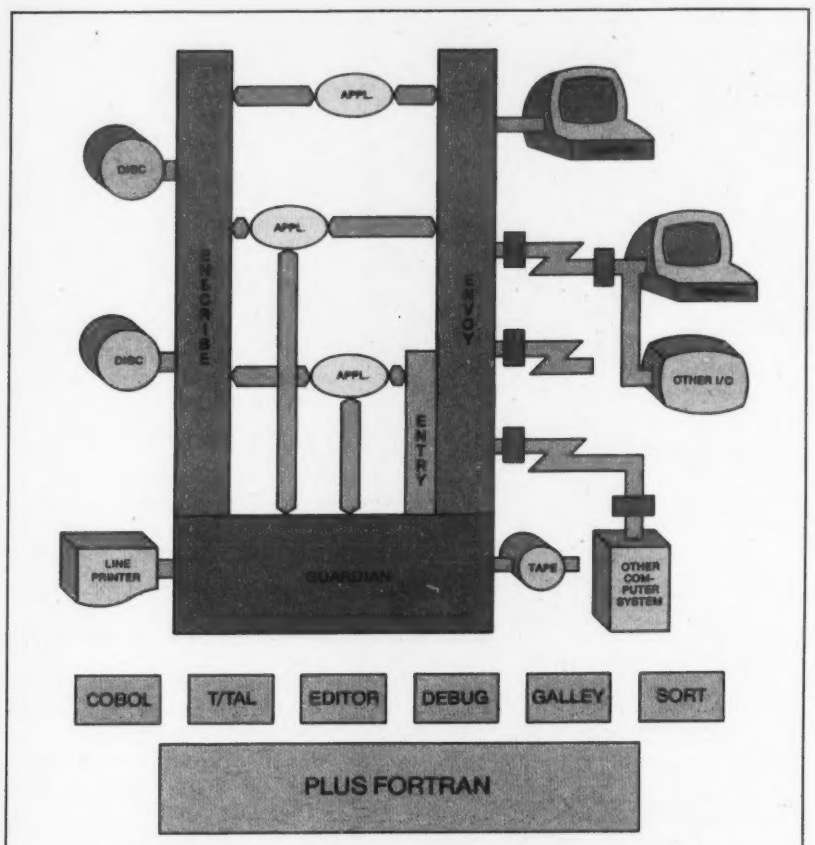
I have been in many DP shops where data base was proceeding satisfactorily until the first end-user system was attempted. The associated problems will be the subject of another column.

Summarizing some complaints of existing systems, the end user would rather not have to worry about:

- Names of fields.
- What fields are in what records (and where in the record).
- What the internal formats of fields are.
- What intrafile record rela-

(Continued on Page 64)

first in FORTRAN. And it's Non-Stop!



The unique interaction between Tandem NonStop Hardware and Software makes the multiple processor system easy to use and easy to expand.

makes it possible to access key-sequenced, relative and entry-sequenced files by primary or up to 255 alternate keys. Provisions have been made to allow exact, approximate or generic positioning into an ENSCRIBE file structure using FORTRAN. Concurrent data base access with other programs and languages is supported with LOCK mechanisms at either the record or file level.

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Program Watches DL/1 Executions

WELLESLEY HILLS, Mass. — The DL/1 Run Control System from Computer Partners, Inc. was developed to ensure the integrity of IBM-IMS data bases and associated applications operating in a production environment under the DL/1 data management system, according to a spokesman.

Data regarding an application's job steps, data base usage, run dependencies, JCL and job step descriptions are stored in the Run Control System data base. This information is then used to initially load the job stream into the job queue, control the sequence or steps processed, ensure that current versions of the data bases are used and recover the necessary data bases if a job abnormally terminates, he said.

After an Abend, the Run Control System data base determines the proper job steps which must be executed to recover and complete the jobstream successfully once the cause for termination has been corrected, the spokesman continued.

Operating on any IBM 360/370 supporting DL/1 or IMS, the DL/1 Run Control System can be purchased for $7,500 from Computer Partners, at 31 Washington St., Wellesley Hills, Mass. 02181.

Relational Approach to Data Less Than Appealing Now

(Continued from Page 63)

tionships exist.

• What interfile record relationships exist.

The relational data base concept employs certain logical operators (e.g., JOIN, PROJECT, SELECT) to select records (excuse me, tuples) of interest. I would like a lot of distance between myself and a non-DP executive if I were required to present the concept of tuples, domains and logical operators.

Quite frankly, most non-DPers want something simpler. That something could be another level of abstraction above the logical relational data base concept or an abstraction above any of the major data base packages.

In short, I don't see any real advantages of the relational concept to end users. They want something even simpler, preferably oriented toward their area of responsibility.

Programmer/Analyst View

The applications programmer/analyst will probably interface with a relational data base system in one of two ways: a CALL mechanism (as in most of the data base packages) or a set of data base verbs which will be embedded in Cobol or Fortran programs and input to a compiler preprocessor (Codasyl).

Quite honestly, I don't see that the logic of JOINing, SELECTing and PROJECTing is markedly simpler than the logic one finds in many existing data base packages.

To summarize again, although I like the logical concept of tuples, and the relational operator set, I cannot believe this would constitute a very strong argument for relational systems.

Administrator Interface

By data administrator, I mean the function responsible for building a data base system environment. Typically, one of the major tasks of such a group is building a logical model of the organization's data.

At the present time, I personally prefer other modeling methodologies to the relational approach. In particular, I prefer the freedom to have repeating groups (i.e., one or more fields which occur multiply in a "record") in my structures.

I find the step of going to first normal form unnatural for those systems on which I have worked. It may well be this is simply a result of conditioning. After working with relational concepts a while longer, I may change my view.

Robinson is an independent consultant, operating as S.L. Robinson & Associates, in Morrisville, Pa.

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Clarification

In Datapro's recent survey ["Users Rate CDC as Tops in Network Service Study, CW, May 22], United Computing Co. ranked second, with a weighted average overall performance score of 3.4 (out of 4.0) and National CSS, Inc. and Comshare tied for third at 3.3.

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Elevating Talk Moves Stalled System Plan

By Gary D. Ward
Special to CW

Ajax Bolt and Nut, Inc. a growing manufacturing firm, was having trouble with its inventory system. The company always seemed to have an overage of parts and materials that were rarely used, but a severe shortage of the materials that were needed daily.

In fact, the problem had gotten so out of hand that complaints about it had reached all the way up to the operating president of Ajax.

Being a good businessman, the president immediately called in his plant manager and heard all the details and ramifications of the problem. Next, the planning committee (whose main purpose was to make sure the president stayed happy) got involved.

The committee decided the best way to handle inventory was through the computer. After all, that's why they had leased the monster anyway. The committee told the DP director the inventory problem had to be solved in a minimum amount of time.

Jealous Committees

The director called in his project leaders and explained the urgency of the problem. It would require a thorough systems review before processing on any path. The project leaders agreed and, in typical fashion, each formed his own systems review committee.

Each of the systems review committees, as expected, met in secrecy and jealously guarded their solutions — with one exception. A brash systems analyst reviewed the problem and, after a couple of weeks, told his project leader he had the solution.

After looking over the proposal, the project leader smirked and said, "this is far too simple. It's evident you don't understand the big picture."

And so it went. Weeks quickly turned into months as the committees argued about their respective approaches and the benefits of their solutions over everyone else's.

By this time, the DP director had become desperate and had hired an outside consultant. The president, who was unhappy with everything and everybody, was fuming because this expensive problem was becoming more and more severe.

One day, in the elevator, the president overheard the systems analyst explaining the inventory problem and his simple solution to a friend. The president called the analyst aside and asked to be briefed on the proposal.

The president loved the idea and showed it to his planning committee. The committee, in turn, thought it was the greatest idea that Mr. President had ever thought of and told the DP director to implement the plan immediately. The DP director disbanded the committees.

"We've found a solution!" he exclaimed. "Begin implementation immediately."

The lowly analyst was handed an assignment. After reading it, he discovered his ideas in someone else's words. Since he didn't want to cause trouble, he simply went to work on the project — almost six months after he had submitted his proposed solution.

Moral: Good ideas come from above and below. Keep your communications lines open.

Ward is a system aid marketing representative with University Computing Co., Dallas.

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Prime Minis Get Word Processing

NEW YORK — The Primacs-I word-processing software from ACS America, Inc. is said to provide users of Prime Computer Corp. minicomputers with "all of the standard features of today's best stand-alone word-processing systems."

The package was designed to operate with the Prime P300, P350, P400 and P500 models utilizing their standard operating systems. It supports up to 63 simultaneous users, unlimited document size and full document indexing and retrieval, a spokesman said.

Features available through Primacs-I include insertion and deletion of text, pagination, upward and downward scrolling and paragraph and decimal tab-setting.

Primacs-I operates with an 80-character, 24-line, 32-function-key Owl CRT terminal and a 520 word/-min typewriter-quality serial printer with interchangeable type fonts. A shared-logic system, the ACS package is co-resident with any standard DP application placed on the hardware, the spokesman claimed.

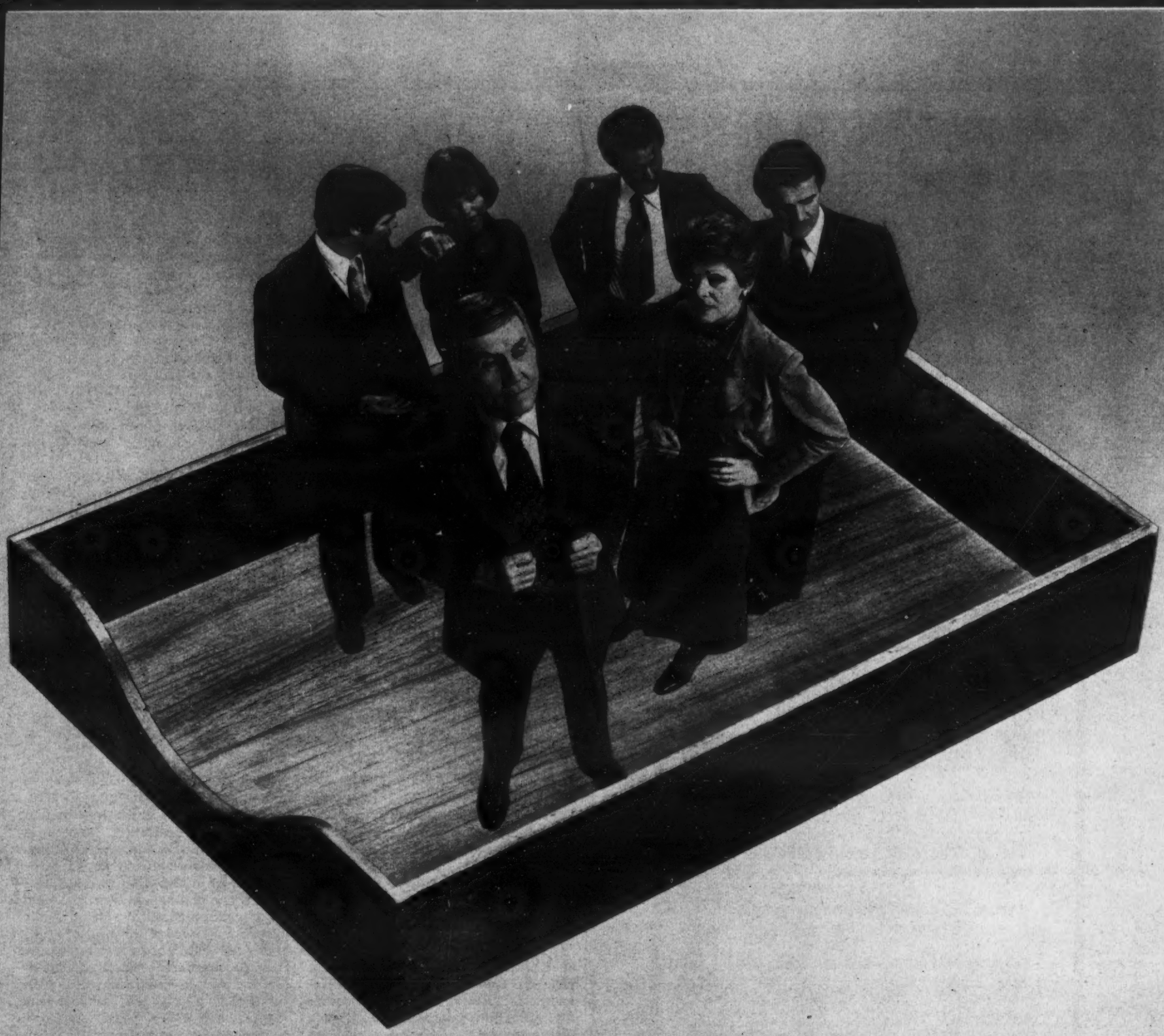
The software for Primacs-I is available now for $15,000, installed on the user's equipment. If desired, ACS America will also supply the required hardware "at competitive rates," the spokesman noted from 150 E. 42nd St., New York, N.Y. 10017.

National Directory To List Consultants

ST. LOUIS — The Independent Computer Consultants Association plans to publish a national directory in the fall. Any individual, partnership or corporation providing computer-related services will be listed without charge, a spokesman said.

Once published, the book is expected to cost "about $10," he added.

Submission forms for the listings are available from the association through P.O. Box 27412, St. Louis, Mo. 63141.



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'Vast Flows' of Data Controlled

Varied Facilities Backed by Remote Nets' DBMS

By Don Tarkenton
Special to CW

PITTSBURGH, Pa. — Many inquiry and retrieval systems appeared in the 1960s as time-sharing became widely used. These systems have evolved into the interactive data base management systems (DBMS) now available from a number of remote computing services.

The key to an enterprise's success is whether it can control the vast flow of data through its organization. It is the ability to meet this goal that is responsible for the success of DBMS. These systems can produce timely and accurate information and can quickly respond to the changing needs of the enterprise.

Characteristic of most DBMS packages is the tendency toward data independence — the separation of the logical structure from the physical structure of the data base. Access at the field level to logical groups of data allows the data base to be different things to different people.

By storing data along its separate functional lines, data base packages can represent a variety of record types, or subschemas, in the data base. This ability to handle different record types leads to the integration of the different parts of an application, such as the part, order, vendor and customer data in a purchasing system.

Integration eliminates redundancy and establishes consistency among the data. The benefit to management is control over the process, because the DBMS provides an overall view of the application.

Access Philosophies Differ

The access methods used by data base systems for processing data differ in philosophy. Some provide very fast access at the cost of overhead and storage space, while others are directed at updating and reporting on large volumes of data while conserving storage and reducing overhead. Many systems try to strike a balance between the two extremes by offering a variety of access and storage techniques.

Most of these techniques are automatically handled by the DBMS and are usually transparent to the user. The user can thus devote himself to developing and using the application.

Data can be treated by the DBMS in a way that affords many capabilities to the user. These capabilities often eliminate the need to learn and use a high-level programming language such as Fortran or Cobol.

First, data can be stored in a number of different field types. The user can pick the type to match his requirements for data format, processing, entry validation, compaction efficiency and reporting ease. Also, subfields and aggregate fields (e.g., month, day and year in a date field) allow differing treatments of the same data.

Further, pseudo fields, also called computed or defined fields, are available in some systems. The user simply specifies a numeric calculation, which can involve other fields, to be performed whenever the field is referenced. For example, PROFIT = PRICE - COST.

Finally, validation of data is usually automatic and often extensive. Validation activites include data type, range checking, table look-up, existence and cross field validation (e.g., ORDER DATE must be less than DATE SHIPPED).

More Revision Capabilities

Applications tend to change and grow more complex over time. DBMS have added extensive revision capabilities which can respond to the situation. It is possible to change validation ranges, add new fields, add new record types and link to new data bases, all without impacting existing applications and users.

Importantly, a few systems are able to dynamically invert specific fields, thus providing rapid access as the user's need changes. These revisions can usually be made without costly dumping and reloading of the data base. Furthermore, the speed and adaptability of data base systems in responding to changes in the application can shorten new development time by orders of magnitude over conventional programming techniques.

One of the biggest drawing points of data base systems is that they are typically easy to use. Proficient users can develop applications in a matter of days. Users can often be trained in the basics of the data base language in a few hours. Significantly, most data base systems are aimed at nonprogrammers — managers, applications specialists and clerks.

The trend in DBMS is to make the language as English-like, or natural language, as possible. Some languages require a key word to begin the command, such as FIND, CHANGE or PRINT, followed by a fairly free-form trailing list of specifications. Other languages are free form with key words appearing anywhere in the command.

Noise words — such as "a," "of," "the" and "me" — can be included to improve readability. For example, PLEASE LIST THE NAME AND TITLE FOR EVERYONE IN MARKETING. Regardless of the degree of structural freedom allowed, most languages are easy to comprehend.

Most DBMS packages are interactive in nature and provide immediate response in terms of timely information concerning an application. Capabilities include record creation and updating, query and report generation.

Simplicity in record creation is facilitated by a number of features. Field values can sometimes be entered in any logical order, either through prompting by the DBMS or by loading in bulk from an external file. Some systems allow the user to specify default values for fields which are automatically stored when a new record is added. Messages concerning invalid records (automatic validation) are sent to the user, and some systems post rejected records to an error file for reprocessing.

Query is often in the form of heuristic searching. The user can browse the data base by means of iterative searches. Each query successively narrows the list of selected records until the desired results are obtained. Alternatively, a query can add records to a previously selected group.

The ability to do report generation is universal to all DBMS. Reports provide the timely information required by management to control the application. Common features include titles, headings, footings, computations, logic testing, detail and summary information. A sort capability is usually available to provide control breaks.

In addition to displaying results on the terminal, some packages can send reports to a high-speed line printer, save them in a file or generate graphic output. The report commands can be stored in a file for later execution. It is often a simple matter to modify these saved commands, providing the flexibility needed to satsify ad hoc requests.

In addition to interactively changing field values and deleting records, some data base systems provide the ability to do transaction processing. In such sys-

(Continued on Page 69)

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A/V Guide Lists Wide Range of Training Aids

Despite a lack of increase in training budgets, courses produced by the multimedia vendors continue to proliferate. The 11th annual *Guide to Audio/-Visual Instruction on Data Processing*, released last week by the University of Colorado, lists more than 2,000 course modules from 15 vendors.

The quality and quantity of training aids continue to grow significantly. Five years ago we had difficulty locating materials to fill the guide. Now we have trouble finding space for all the course listings.

J. Daniel Couger On Education

Some subjects, such as operating systems, still are more effectively taught through classroom instruction by a vendor. Some application areas, such as banking, do not have multimedia courses available.

Nevertheless, for the large majority of training needs for all levels from beginning to advanced, multimedia courses have been produced. Also, there are a variety of vendors from which to choose a course.

The absolute number of dollars available for training has increased. Although the percent of the DP budget allocated to training is unchanged, the total DP budget continues to expand. Therefore, more dollars are available for training. Based on the swelling revenues of the multimedia vendors, we can see that most of the increase for training is going in that direction.

This year, Deltak, Inc. surged into the No. 1 position among the independents, displacing Advanced Systems, Inc. (ASI). According to Deltak president Robert King, the company's sales will reach $18 million to $20 million this year. Last year, Deltak had sales near $12 million.

Deltak's Education Coordinator Workshop, held four times in 1977, will soon be offered monthly. So, along with the increased demand for multimedia courses is an expanded effort to train the trainer.

Edutronics' Management Course

In addition to courses for practitioners, the multimedia vendors are continuing to produce user-oriented courses. Edutronics' new course "Using the Computer as a Management Tool" is obviously designed for managers. We find it equally useful for potential managers (business school students).

The 12-module course includes videotapes, participant's course manual, case studies, conference leadership grids, manuals and training charts. The course has been used by the American Management Association and in Honeywell Information Systems, Inc. training programs.

Modules cover the following topics: "Data Is Not Information," "Identifying Information," "Information Services Department," "New Forms," "Describing Processing," "Systems Analysis and Computer Programming," "Sign Here," "Selecting Methods," "How the Computer Works," "Why Can't I Have One of Those," "Implementing the System" and "The Storage Area."

According to Vice-President Pat Sorrentino, some 80 new modules will be released in the third quarter, including the following: advanced assembly coding techniques, IBM's CICS/VS, System 3 RPG, OS utilities, MVS utilities, IMS, TSO, MVS dumps and structured programming.

The vendors are keeping pace with recent developments, both in hardware concepts and software tools.

We're using Deltak's Structured Design Series for our course in system analysis and design, required of information system majors. Included in our course are eight modules from Deltak's structured programming course for programmers and analysts: the programmer productivity concepts (I & II), the team (implementation and interpersonal dynamics) top-down program design and development (I & II), IBM's Hipo and Warnier diagrams.

Deltak will release 75 additional modules during the summer months, according to Serge P. Beauregard, vice-president. Courses and modules are" "VS1 for Operators" (seven modules), "Cost/Benefit Analysis" (four modules), "CICS Application Design" (five modules), "Structured Cobol" (16 modules), "Missiles of October" (six modules), "Data Base Requirements Analysis" (four modules), "Finance for

(Continued on Page 70)

DBMS on Remote Nets Include Varied Facilities

(Continued from Page 68)

tems, bulk updates are stored in a transaction file that is then economically processed against the data base. The most powerful of these systems allow different types of transactions — create, change and delete — to be intermixed in the transaction file.

Data base systems provide the ability to query, update and produce reports, either in a stand-alone mode or by interfacing to a programming language, such as Fortran, Cobol or PL/I. The need to use a language outside the DBMS has been virtually eliminated by some systems. These systems have extensive computational, testing (IF ... THEN ... ELSE) and branching capabilities.

The most powerful extension of these capabilities has been the development of procedures, also called macros. Procedures are routines, written in the language of the data base, which are used in a production environment to do query, updating and report generation.

The user typically enters parameters (occasionally in response to prompting by the procedure) which control the processing performed. Available techniques include chaining and nesting of procedures and even recursion, where a procedure can execute itself repeatedly.

Finally, today's systems offer the user a variety of security and integrity features. Security measures include passwords at the field, record and file levels, data encryption and transaction logging for surveillance.

Important integrity checks are built in to protect against loss of data, to correct erroneous updates and to handle concurrent use of the data base. Techniques to insure integrity include backup, checkpoint restart and audit trails. If either the security or the integrity of the data base is insufficient, the user loses control over the application.

No system provides all the features described above, but most provide a mix of capabilities which can be tailored to customer applications. No single system is best suited to meet the processing needs of all users of DBMS. Rather, potential users must first consider their current and future applications and then look for the DBMS which will best serve their needs.

Tarkenton is a senior systems analyst with On-Line Systems, Inc., a Pittsburgh-based remote computing service.

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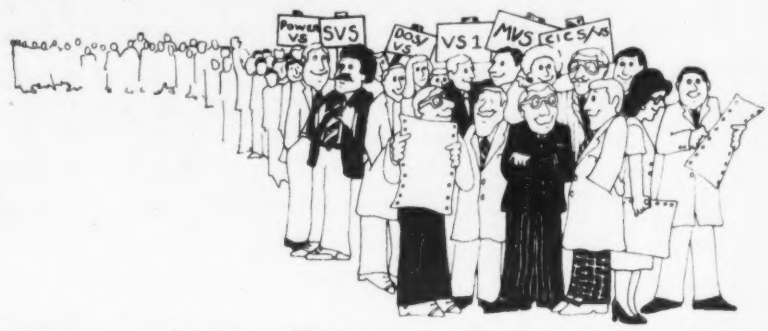

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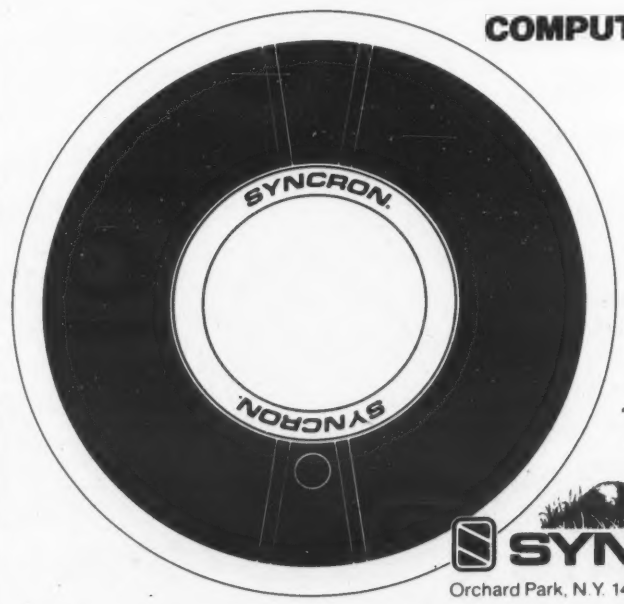

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'Dynamo' Now on Minis

CAMBRIDGE, Mass. — Dynamo, a continuous simulation language available on large-scale systems since 1960, has been adapted to minicomputers. Mini-Dynamo operates on CPUs from Digital Equipment Corp., Data General Corp., Varian Corp. and other suppliers, according to the vendor, Pugh-Roberts Associates, Inc.

In its dynamic modeling of industrial, social and engineering systems, Mini-Dynamo is said to work with standard Dynamo equation formats and to produce user-specified tabular and graphical output.

The package also handles automatic sorting of equations for correct computational order and allows a model to be rerun without recompilation, he said. Mini-Dynamo is available for a license fee of $2,500 ($1,000 for educational users) from 5 Lee St., Cambridge, Mass. 02139.

Growth in Available Training Aids Shown in Update of A/V Guide

(Continued from Page 69)

Nonfinancial Managers" (seven modules), "Power/VS" (three modules), "Structured Analysis" (seven modules), "MVS Conversion Guide" (one module), "MVS Selectable Unit Guides" (three modules), "Distributed Processing Techniques" (four modules) and "Project Management" (eight modules).

Rohit Patel, vice-president of ASI, identified nine new DP courses in that vendor's line.

The new course on Jackson methodology and related program design techniques includes an interview with Stan Rifkin, vice-president of Infotech International. Rifkin maintains that the structured software technologies that have developed during the past several years (such as structured design, structured programming, Hipo, top-down design, modular programming and stepwise refinement) have failed to produce exacting, bug-free programs.

"They tend to concentrate on the problem rather than the process at the program design phase," he said.

According to Rifkin, functional-decomposition methods may work correctly using human creativity, experience and intuition at the higher requirements definition and system design levels, but program design needs to be a more mechanical process, corresponding input with output.

His company's Infotech Programming Technique (IPT) is based on the data structure design techniques introduced by Michael Jackson in England.

Other new ASI courses include: "CICS/VS — Release 1.3"; "Metric & DP: A Measure of Progress?"; "Job Analysis: Focusing on the Programmer"; "Software Security — Protecting the Data"; "Mark IV: Processing and Reporting"; "RPG-II Learning Series"; "MVS Dumps (JES2)"; and "On-Line Systems: The Logical Choice?"

The *11th Annual Guide to A/V Instruction in Data Processing* lists the products of each of the suppliers of A/V materials. For a copy, send $4 ($5 if you require an invoice) to *Computing Newsletter*, Box 7345, Colorado Springs, Colo. 80933.

Couger is professor of computer and management science at the Univeristy of Colorado.

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'Exchange' Set For Publication

VALENCIA, Calif.— Scheduled to be available "soon" at computer stores or by subscription, the *Software Exchange* will be a bimonthly publication devoted to programs for small systems.

The magazine is expected to carry reviews of user groups, software packages and consultants working with the small computers. Classified advertisements, covering both software for sale and wanted, will also be provided.

Hopefully, each program listed will have a description of its operation and hardware requirements as well as data on where materials that make up the "package" can be obtained, the publisher said.

The magazine will cost $1.50/copy in stores or $8/year for six issues. Other information, including advertising rates and submission forms, is available from *The Software Exchange*, Box 55056, Valencia, Calif. 91355.

System Serves 77 Counties

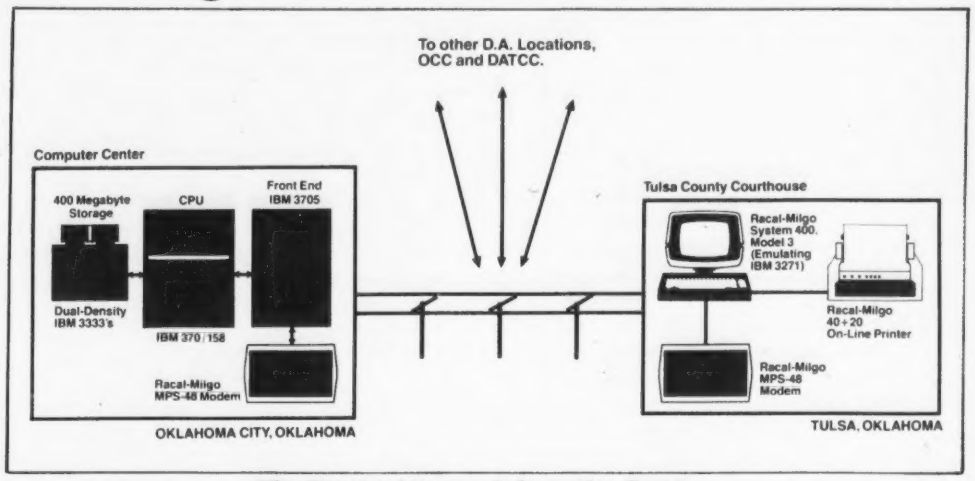
Terminal Net Easing Prosecutor's Job

By Glen Wallace
And Jim Wilson
Special to CW

OKLAHOMA CITY, Okla. — Multidropped high-speed terminals and printers linked to a computer center here are providing state prosecutors with immediate DP access for case preparation and management, recordkeeping, report generation, subpoena printing and automatic reporting of case dispositions.

The District Attorney Information System, Dais for short, has been operating with initial funding of close to $200,000 provided by the Law Enforcement Assistance Administration (LEAA). Service to 77 state counties is maintained by the Oklahoma Crime Commission (OCC) under control of the state District Attorney Training and Coordinating Council (DATCC). OCC provides trained computer personnel as well as DP and terminal equipment.

System terminals and printers are in place at district attorney offices in five Oklahoma counties: Oklahoma, Tulsa, Comanche, Cleveland and Muskogee. The equipment, used to make information requests, to enter information and to print reports and forms, is linked with the DP center here by a leased multidrop line.



The District Attorney Information System

Racal-Milgo, Inc. MPS-48 synchronous data modems handle data from these locations at a rate of 4,800 bit/sec, facilitating fast reponse times — typically about three seconds.

Automatic polling or calling of each of the prosecutor locations for messages is controlled by an IBM 3705 front-end processor at the DP center. The CPU at this site is an IBM 370/158, which operates in conjunction with IBM 3330 dual-density storage units.

This equipment, which provides on-line processing and storage capacity of about 400M bytes, currently maintains 200,000 criminal records and 52,000 case-disposition records, with about 4,000 master records added each month.

Data handling and display at the remote sites is accomplished using Racal-Milgo System 400 Model 3 terminals configured to function in either IBM 3275 or 3271 terminal modes. Terminals operating in the 3275 mode operate a CRT exclusively and are located at OCC and DATCC.

System 400 terminals emulating IBM 3271

(Continued on Page 72)

Real-Time Management System Tracks Network Performance

LARGO, Fla. — A network management system that reportedly "tracks" the performance of data communications networks on a real-time basis and provides specific information on circuit problems in conversational English has been introduced by Paradyne Corp.

The system, called Analysis, automatically gathers, displays and stores data on the performance of data communications lines, modems and terminals in point-to-point and multidrop networks.

Two versions of the network management system are available — the CCA, featuring a rack-mounted alphanumeric Touch-Tone entry pad and LED readout, and the CCB, which includes keyboard/CRT terminal and hard-copy printer. Either configuration allows nontechnical operators with no special training to control networks from a central site, the firm said.

Analysis automatically collects data from as many as 144 multidropped lines, displays that data in plain English and provides control over modems throughout the network, according to a spokesman. In addition, it provides management reports on network, line and modem availability.

Analysis is based on Paradyne's MP-48, a 4,800 bit/sec modem which employs dual microprocessors in place of hard-wired logic or LSI circuits. One MP-48 microprocessor is said to handle such functions as equalization, scrambling, encoding and filtering,

(Continued on Page 72)

Both Types of Bread Available To Convenience Store Shoppers

LOUISVILLE, Ky. — At Convenient Food Mart stores here, making a savings deposit can be as simple as picking up a loaf of bread. In 60 of Convenient's Jefferson County stores, IBM 3608 financial service terminals, which are part of Citizens Fidelity Bank's Service Tree electronic banking network, enable customers to do many banking transactions at neighborhood stores.

"Our stores are located and designed to provide handy shopping for our customers," according to Robert Johnson, senior vice-president of Convenient Industries. "We decided to offer self-service banking as another way of helping them."

The table-top terminals have been programmed by the bank to enable transaction card holders to make deposits or withdrawals to and from checking and savings accounts and to make balance inquiries. Cash advances from Visa accounts are also available using the in-store terminals.

Citizens Fidelity customers using the system insert a transaction card, enter a personal identification number (PIN) and select a transaction. The terminal prints an authorization form for the customer.

The terminals are linked to an IBM Model 3602 controller connected to a Model 3705 front-end processor, which is interfaced to a 370/158 CPU.

(Continued on Page 73)

Let's face it:
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Oklahoma Terminal Net Eases Prosecutor's Job

(Continued from Page 71)
units predominate in the system. In this buffered mode, the System 400 is capable of simultaneously operating both a high-speed Racal-Milgo 40/20 printer and CRT screen, allowing the keyboard and screen to be used while an incoming message is being printed.

A total of eight System 400 terminals and six high-speed 40/20 printers are in operation, with plans already under way for future expansion.

The basis of data entry in Dais is either written reports or terminal forms filled out by the prosecutor personnel. These reports, prepared when an individual is screened by a prosecutor and after each court appearance, include complete personal data, arrest information, defense attorneys, individuals involved, charges and status, witness listings and trial data.

When a form is completed, the prosecutor's terminal operator keys the information into the System 400 CRT screen. Written forms from counties without terminals are mailed to the OCC terminal center for data entry.

Immediate access to stored data on convictions, court transactions, arrest information, witness records and other pertinent information is reportedly helping prosecutors prepare better cases, make quick decisions and manage a large number of cases.

In operating Dais, a large store of information is built up. On the basis of this data, the system can generate a number of printed management reports for use by prosecutors. Thirty different reports can be generated at the central site.

Dais hopes to expand on-line service to other counties when funds become available.

Wallace is director of the Statistical Analysis Center of the Oklahoma Crime Commission. Wilson is manager of statistics at the Oklahoma Crime Commission.

Unit Tracks Network Ills

(Continued from Page 71)
while the other provides dynamic information on transmission impairments and controls the modem processor during diagnostics.

MP-48 master and slave modems are linked along a low-speed (110 bit/sec), noninterfering diagnostic channel monitored by a minicomputer-based diagnostic processor at the central site.

Information on loss, noise, phase jitter, amplitude and phase delay distortion and other performance parameters is gathered from every drop on the network, assembled and analyzed for exception and alarm states and displayed in conversational English on the CRT screen or LED readout, the company said.

Major components of Analysis are a minicomputer-based central site control unit, one or more MP-48 master modems and up to several hundred MP-48 slave modems located throughout the network.

The central site control unit includes the 16-bit minicomputer with 24K words of memory; a 920-character CRT with separate keyboard; and a disk controller and two floppy disk drives, each able to store 242K characters. The CCB version of Analysis also includes a 120 char./sec printer.

The CCA version of Analysis with manual control is priced at $3,500; the CCB with CRT, microprocessor, dual floppy disk storage and printer costs $36,600.

Remote sites cost $3,000 each, but a remote diagnostic board can be added to MP-48 modems already installed at a cost of $850.

The Analysis systems operates with Paradyne modems at 4,800- or 2,400 bit/sec, Paradyne said from 8550 Ulmerton Road, Largo, Fla. 33541.

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At best, you now find yourself trying to find a system that will solve just some of your problems. You're willing to compromise on the other problems. And, in the end, you'll settle for some kind of a system you can call your own.

Direct Message Entry Terminal Bows

WESTLAKE VILLAGE, Calif. — A direct message entry terminal has been announced by Franklin Systems Corp. Designated the Franklin TO-2000, the system reportedly modernizes Telex and TWX operations by eliminating the need for Teletype 33ASR or similar entry units.

This results in cost savings of up to 90% on normal Teletype operations, depending upon the number of operators and shifts in use, the company claimed.

The TO-2000 scans, at 330 char./sec, messages typed on a standard IBM Selectric typewriter and either sends them to a paper tape punch, eliminating tape preparation, or to the Franklin Auto-Dial and Memory System, which transmits directly into the Telex or TWX network and receives on a printer, according to the firm.

The TO-2000 features automatic sending if no errors or unreadable characters exist and CRT text editing.

The system, including an optical character recognition unit, CRT with keyboard and paper tape punch, sells for $60,000. The rental price is about $1,500/mo on a five-year lease. Franklin is at 733 Lakefield Road, Westlake Village, Calif. 91361.

Software Gives CDC Users RJE Link to Sycor 445

ANN ARBOR, Mich. — Sycor, Inc. has enhanced the communications capability of its Model 445 distributed data entry and processing system by adding Control Data Corp. remote job entry (RJE) to its program library.

In addition to the printer, CRT screen and keyboard of the CDC UT200 terminal, the Sycor 445 system offers a choice of five printing speeds and the use of disk files, diskette, cassette and magnetic tape, a spokesman said.

Users of Sycor 445 systems are not confined to the peripherals available on the UT200 or similar CDC terminals, he added.

Users of 445 systems can tailor the RJE software to fit the requirements of the CDC host computer and the available transmission capabilities by configuring the software for items such as line speed and number of buffers. This is done by setting configuration instructions which are stored on the 445's disk, the firm said.

The system reportedly allows the RJE user to concurrently perform data entry while communicating with the host computer. Since up to eight Sycor CRT units can be attached to the 445 system, other tasks can be done while the software is running, according to the company spokesman.

The CDC RJE software will be available free of charge to 445 users in October. A typical 445 configuration, including 5M bytes of disk memory, four data stations, one bidirectional printer and a communications adapter sells for $60,000.

Lease rates are $1,397/mo on a one-year lease, $1,277/mo on a two-year lease and $1,156/mo on a three and a half year lease, all including maintenance. Sycor is located at 100 Phoenix Drive, Ann Arbor, Mich. 48104.

Store Offers Bread, Cash

(Continued from Page 71)

To complete the transaction, the customer takes the authorization to the checkout clerk. The clerk takes the checks or cash to be deposited or gives cash to the customer for withdrawals.

According to Johnson, offering the service not only helps customers, but benefits the stores as well. "We've seen increased traffic in the stores offering self-service banking," he said. "It gives customers another reason for shopping at Convenient Food Marts."

Well, prepare yourself for a pleasant surprise. You don't have to just settle anymore, because National CSS, Inc. is introducing the NCSS 3200 Series of computing systems.

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IBM Enhances Data Collection System

ATLANTA — IBM has added enhancements to its 5230 data collection system that "enable it to move into new business environments," according to the firm.

One addition is the Model 5239 Value Read Module and Attachment Feature, which can record material weights at various stages of an operation as well as read cycle counts, run times and linear measurements, the firm said. By combining such readings with other data, including job or employee information, the computer can generate billing data and inventory lists along with production and other management reports.

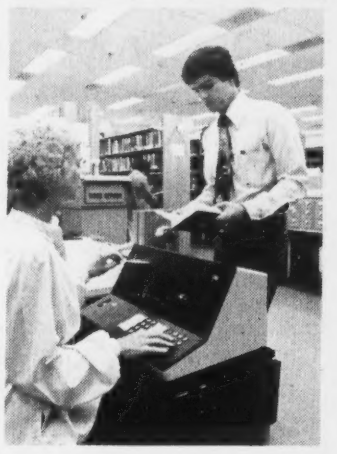
Value Read can operate in manual, protected, semiautomatic and automatic data entry modes, the firm said. The module and attachment will be available in September for $1,940 or the feature can be leased for two years at $61/mo.

Another enhancement is the Model 5236 data entry station, designed for areas such as hospital nursing stations, library check-out counters, stockrooms, loading docks and quality control laboratories, the firm said.

A spokesman said that the 5236, like the Model 5235 data entry station, can be used with Value Read and the Badge Contracts Closure feature enabling employees to control such devices as gates, lights and alarms by inserting their badges at an entry station.

A basic 5236 sells for $1,580 or leases for $55/mo for two years. It will be available in December.

In addition, through bisynchronous communication, the 5230 can be attached to the IBM 5110. Informtion collected at various entry stations is transmitted to the 5110, which can generate various management reports, according to the firm.



IBM 5236 Data Entry Station

Scan-Data Gives Fast Food System Remote Access

CHICAGO — Scan-Data Corp. has introduced an addition to its Positran fast food order entry and operations control system that reportedly enables fast food owners and operators to communicate directly with the system from remote locations over standard telephone lines.

Called Telstat, the option enables an owner-operator to monitor and participate in store operations through the use of a keyboard printer or display terminal, according to the firm.

Any of the more than 70 Positran management accounting and control reports dealing with cash control, sales analysis, inventory control and labor cost control can be accessed over telephone lines from another store, a central office, home or any remote location, according to the firm. In addition, Telstat provides the ability to change prices, recipes, pay rates and other base information; to monitor sales activity by product, cashier or for the entire store; and to observe inventory, labor and cash status, the spokesman said.

The Telstat option is available from Scan-Data for $1,000 with delivery in 60 days. The firm is located at 800 E. Main Street, Norristown, Pa. 19401.

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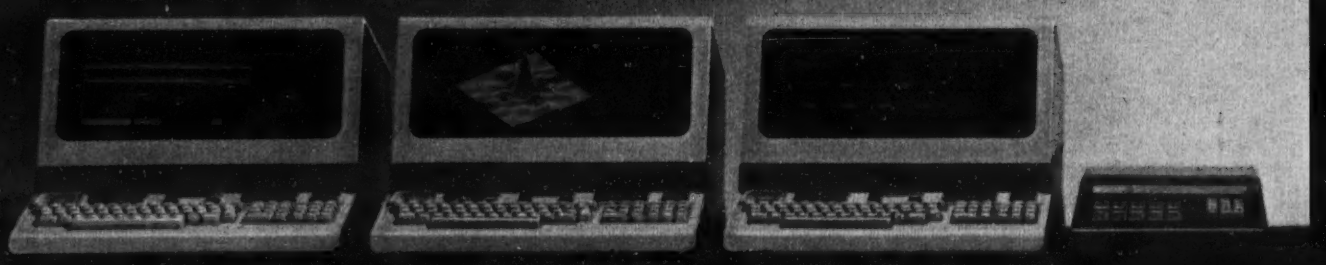

The HP 2645A is the smartest of our alphanumeric terminals. Even so, it's easy to operate. Microprocessor control gives the 2645A easy editing, scrolling and forms building capability. User definable "soft keys" streamline repetitive jobs. Dual, plug-in cartridges provide mass storage up to 110K bytes each. And the terminal can transmit data up to 9600 baud.

The HP 2648A combines full alphanumeric and graphics capabilities. These include auto-plot, raster scan, zoom and pan, area shading, pattern definition, and rubber band line. Dual, plug-in cartridges store up to 110K bytes each. The 2648A has independent memories, so you can display words and graphics separately or at the same time.

The HP 2649A gives OEMs a building block approach. You can make a terminal, a controller, or a graphics display station, depending on the optional cards and keyboards you choose. Starting with the basic CRT, microprocessor, I/O and backplane, you customize the 2649A and program the built-in 8080 microprocessor to fit your application.

The HP 3071A Numeric Data Entry Terminal makes it easy to input data to your computer from your warehouse, shipping dock, or production line. You customize the keys' prompting labels so anyone can operate the 3071A easily. And it's RS232C and CCITT V.24 compatible. The HP 3070A Model is IEEE-488 compatible.

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42803HPT7

Multifunction Terminal Handles IBM 360, 370

MINNEAPOLIS — Control Data Corp. has introduced what it said is the first in a series of multiple-function terminals that can be operated as stand-alone processors or terminal devices by business users of IBM 360s and 370s.

The basic configuration of CDC's C-760 multifunction terminal includes a microprocessor-controlled keyboard and CRT display, read-only memory and 49,152 characters of random-access memory, flexible disk storage and controller and a forms-programming language.

This configuration can be expanded by adding an optional matrix printer, a second flexible disk drive, one 16K-byte memory increment and a Business Basic software compiler, a spokesman noted.

The C-760 CRT terminal incorporates a Zilog Z/80 microprocessor, expandable memory and IBM-compatible communications protocols, with printer and floppy disk interfaces and a detachable keyboard. Up to 2,000 characters of data can be displayed in a format of 25 lines with 80 char./line.

The CRT is compatible with IBM 2770, 3770 and 3780 terminals and provides data communications with a host computer at speeds of 1,200- to 9,600 bit/sec, according to the spokesman.

User application programs are stored and entered into the C-760 through the flexible disk subsystem. The subsystem contains a microcontroller, power supply and one or two disk storage units to provide either 512K or 1M byte of formatted data storage.

Depending on the length of the line, the unit prints at rates of 70- or 200 line/min with a speed of 180 char./sec, CDC said.

Two Languages

User programmability of the C-760 terminal is supported by two languages: a forms language that permits clerical operators to generate and execute application programs and an optional business version of the Basic compiler for use by technical operators with more sophisticated program requirements.

The forms language allows an operator to display a form on the terminal screen and define the characteristics of each data field contained in the form. Through a set of registers, intermediate data is carried forward and arithmetic operations are performed at the point of data entry.

When a form is completed, the information can reportedly be stored on a flexible disk, printed or transmitted to the host computer

Extensions to the Basic language in the business-oriented package include 14-digit-precision arithmetic and the ability to handle data strings up to 255 characters in length. These and other enhancements improve the business programming capability of the C-760 terminal, CDC claimed.

The purchase price for a minimum C-760 terminal with CRT, 49,152 characters of memory, floppy disk and the forms language is $8,671. A terminal configuration that adds a second floppy disk, matrix printer and Business Basic sells for $12,750.

One-year lease prices for these configurations are $256 and $384, respectively, per month; monthly maintenance is priced at $85 and $165. Deliveries will begin in June.

CDI Miniterm Gets 32K Option

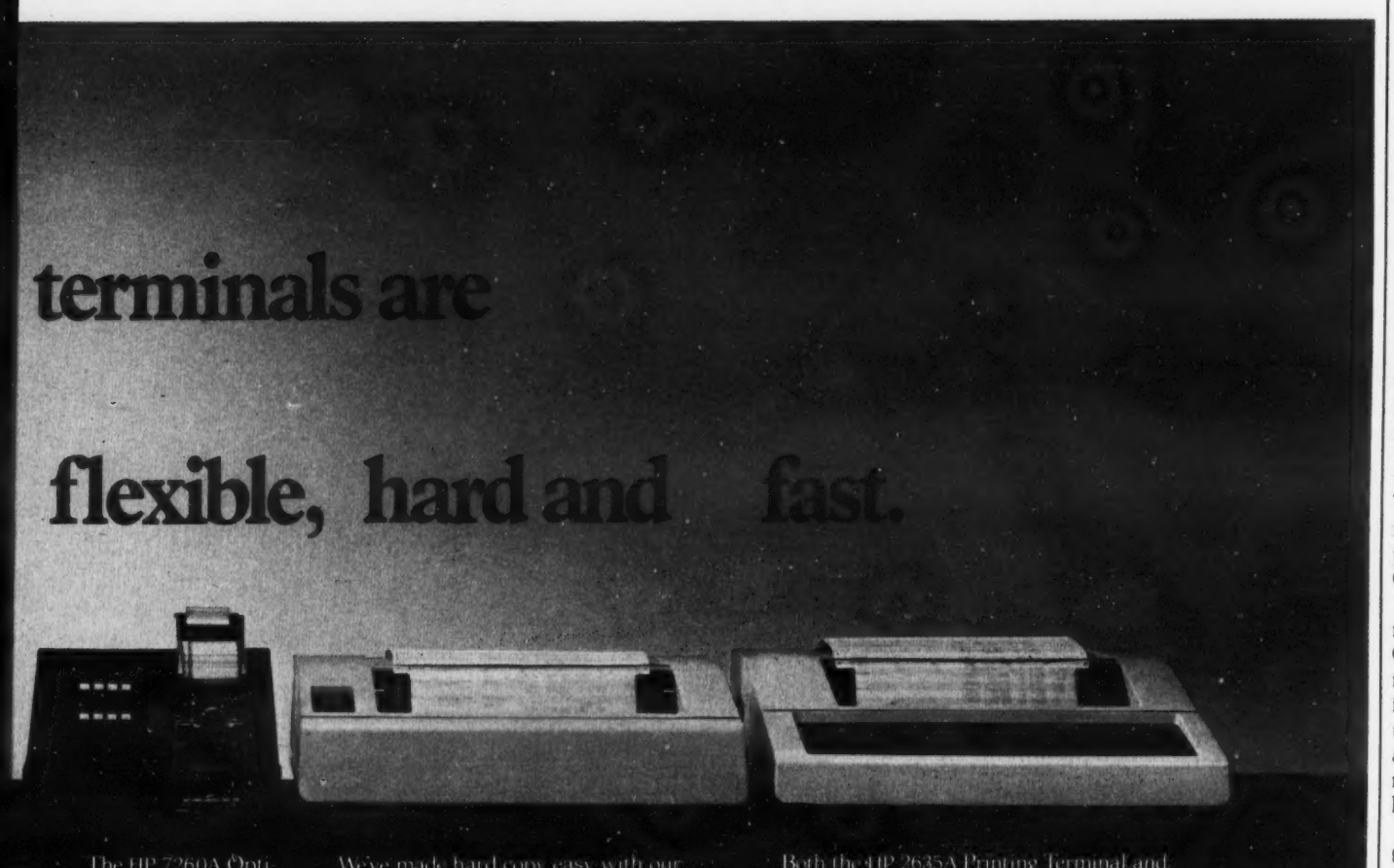
BURLINGTON, Mass. — Computer Devices, Inc. (CDI) has released a 32K random-access memory (RAM) option to its line of Miniterm 1204 desktop and Miniterm 1205 portable automatic send/receive terminals.

These terminals feature an integral 32K RAM and a built-in minicassette tape transport with 68,000 characters of removable storage, according to a spokesman.

The increased memory capacity combines with a three-mode keyboard, a 35 char./sec buffered thermal printer and switch-selectable Ascii or binary code, CDI said.

The 32K option is priced at $750. The base price of the Miniterm 1204 is $3,385, including a one-year warranty, or $165/mo on a one-year lease.

CDI is at 25 North Ave., P.O. Box 421, Burlington, Mass. 01803.



The HP 7260A Optical Mark Reader is a flexible transmission link to your computer. It reads both pencil marked and punched cards, transmits at up to 2400 baud, and with its two RS232C or CCITT V.24 connectors can easily form an integral part of a low-cost RJE station.

We've made hard copy easy with our microprocessor controlled HP 2631A Printer and HP 2635A Printing Terminal. The easy-to-read 7 x 9 dot matrix meets the 128-character USASCII Standard, allows true underlining and descenders, and prints six-part forms. A long-life drop-in cartridge makes ribbon-changing easy, and the Character Expand/Compress mode gives you three ways to print.

Both the HP 2635A Printing Terminal and the 2631A Printer zip along at 180 cps in both directions. The microprocessor determines the optimum print path. A high-speed slew speeds up printing columnar data, and the long-life, self-aligning print head makes for a quick change. Both have self-test features for quick verification of operational status.

These Hewlett-Packard terminals are compatible with all the major interface standards and work with computers from a range of manufacturers. They come with full HP support, service, training, and documentation.

To find out more about these (and others) in our growing line of terminals, call the HP office listed in the White Pages. Or send us the coupon. If you don't see exactly what you're looking for here, let us know. There are plenty more where these came from.

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Canadians Set Electronic Mail

REXDALE, Ont. — A Canadian electronic mail service is scheduled to go into service in November. The designers of the Facscan system, Ivor Kaye & Associates here, estimate it will cost 98 cent/document to provide a two-hour delivery service between users in the areas served.

The service will initially operate between Montreal, Ottawa, Toronto and Vancouver. As demand increases, most of the major centers in Canada will be covered, the designers said.

The cost of the service is "distance-insensitive," the firm said.

In addition, the company plans an express service which will provide a 15-minute delivery service at $1.35 per document and overnight delivery for 70 cents.

System users require a standard facsimile terminal. These are available from suppliers such as Xerox Corp. and 3M Co. for about $55/mo rental or about $1,600 outright purchase, the spokesman said.

Kaye hopes to expand the service eventually to include transatlantic and transpacific facilities, hinging on agreement from foreign administrations and Teleglobe Canada. The company also plans to interface its equipment with a U.S. corporation.

The service has been approved by the federal Canadian department of communications and intercity transfer of information will be via CNCP Telecommunications.

SDLC Logic Chip Has HDLC, ADCCP Acceptance

NEWPORT BEACH, Calif. — An MOS/LSI programmable Synchronous Data Link Control (SDLC) chip has been introduced by Western Digital Corp. The SD 1933A/B has an NRZI encode/decode option and a 1.5M bit/sec transmission rate, according to a spokesman.

Said to be compatible with IBM, High-Level Data Link Control (HDLC) and Advanced Data Communications Control Procedure (ADCCP) protocols, the SD 1933 chip interfaces parallel digital systems to synchronous serial data communications channels employing IBM's SDLC line protocol, the firm said.

The chip was designed for use by vendors of OEM terminal equipment.

In applications such as telecommunications, switching networks, packet switching or in mainframe terminal communications, the SD 1933 reportedly replaces nearly 70 logic ICs currently required for the same function, according to the firm.

The 40-pin chip features synchronous full-duplex operation, programmable modem control interrupts, error detection and a go-ahead option for loop applications, the spokesman said. The SDLC chip may be used with all types of mainframe, minicomputer and microcomputer data buses, Western Digital claimed.

The SD 1933 SDLC protocol includes zero insertion and deletion, CRC generation and checking and automatic detection and generation of special control characters such as Flag, Abort, Invalid and Idle.

The 1933 is compatible with Western Digital's Model 1833 direct memory access (DMA) controller, the firm said.

Prices for the package begin at $25 in 100-unit quantities. Western Digital is at 3128 Red Hill Ave., Newport Beach, Calif. 92663.

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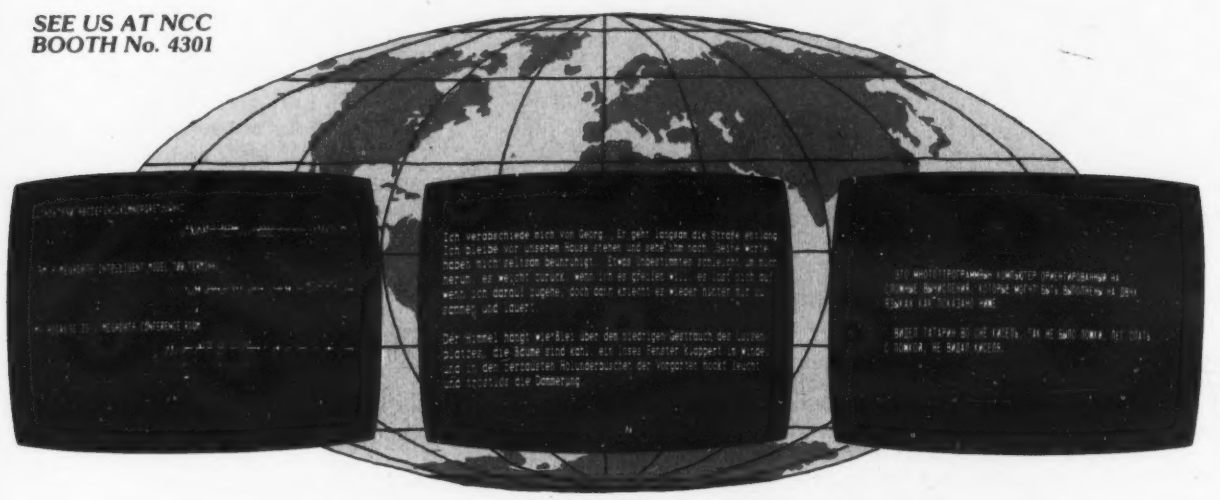
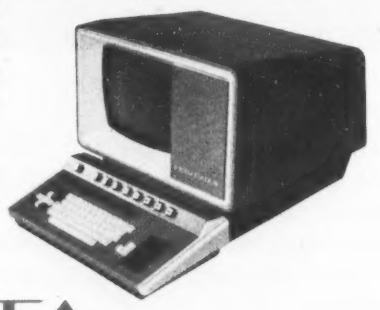


If communicating in Arabic, Farsi, German, Hebrew, Russian, or any other language presents an obstacle to your data processing, MEGADATA's 700/DL Dual Language Terminal will help to overcome this problem. This intelligent programmable terminal can display two completely different character sets simultaneously or separately, using the same bilingual keyboard, and it provides complete text writing capability for two different languages.

The software for the 700/DL is no problem either, because it is tailored specifically for your application. Furthermore, the entire software package can be adapted easily to your requirements, minimizing any change in the existing program. Hardware obsolescence is eliminated by simply updating the software capability. Interactive Data Entry, Complex Interrupt Capability, Forms Control, Format Storage, Validation—they are all available with the 700/DL.



For further information about the 700/DL or the many other application-oriented MEGADATA terminals, call or write TODAY.

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Kaufman Adds Concentrator

LOS ALTOS, Calif. — A data concentrator/multiplexer designed for inquiry/response systems has been announced by Kaufman Research. The Model 811 allows up to eight lines at up to 19.2k bit/sec access to a single computer port, the vendor said.

Buffer storage of several hundred characters per line reportedly makes it feasible for a small computer system to support many devices without losing data.

Application areas include transaction systems, front-end multiplexing and remote concentration of data lines, the firm said. Kaufman Research can supply units with special user protocols, such as line editing and preprogrammed responses.

Prices begin at $2,600 from Kaufman at 99 Sylvian Way, Los Altos, Calif. 94022.

Shop Floor Terminal Reads Badges, Cards

BUFFALO, N.Y. — A bench-mounted shop floor terminal, designed to be located in production work areas, warehouses and receiving and shipping departments for data entry, has been announced by Sierra Research Corp.

The SDA-706MP reads any number of cards or badges interchangeably under software control, according to the firm. Standard 3.25-in. Hollerith cards or badges are used in the reader and up to 80 columns (user-selectable) may be read, the firm said.

The microprocessor-based terminal has a 10-key numeric keyboard and features a 16-digit alphanumeric display, 10 function keys and system status indicators, according to a spokesman.

The unit is priced at about $6,000 from Sierra Research Corp.'s Data Systems Division, P.O. Box 222, Buffalo, N.Y. 14225.

Better Software Essential

Networks Helping Airlines Cope With Traffic

By Sidney F. Quint
Special to CW

Domestic airlines have rapidly expanded their use of computers and of communications links in recent years, and that trend will continue indefinitely for two simple, but compelling reasons: the phenomenal growth in air traffic is fast making manual systems obsolete. Second, intense pressure is being exerted by fuel, labor and equipment amortization costs. To survive, the airlines must increase efficiency in their operations wherever possible, and automation can allow them to do so.

Automation began for most airlines where it has for other businesses — in accounting and other "traditional" DP functional areas. It was the requirement for real-time reservations systems, however, that caused terminal-oriented networks to begin mushrooming some 10 years ago. Today, such networks are continuing to expand with the inclusion of travel agencies in addition to airports and airline ticket offices.

At the same time, real-time reservations networks continue to expand, terminals are appearing in a multitude of other operational areas. Perhaps the largest of these is departure control, encompassing ticketing, check-in and the issuing of boarding passes.

But automation is also under way or planned by many airlines in such areas as cargo control, crew scheduling, catering, maintenance control systems and the updating of information for airport flight monitors. Clearly, the more an airline automates, the more that airline sees what can be automated.

Forces Behind Trend

Behind the trend toward automation among domestic airlines is the declining cost of terminal systems hardware, the evolution of multifunction terminals and the increasing efficiency of communications links made possible by technological advances in high-speed modems, concentrators and other communications-related hardware.

But at the same time that hardware costs are coming down and communications efficiency is increasing, the massive volumes of data generated by rapidly expanding automation is posing problems of circuit saturation for some carriers.

The trend toward redundant computers has all but eliminated problems from processor failures. A variety of solutions can minimize problems stemming from the unavailability of communications lines through saturation or other causes. Those solutions include adding additional lines or adding higher speed lines.

Other solutions will become more clear as communications technology continues to evolve. More widespread implementation of IBM's Synchronous Data Link Control (SDLC) protocol, with its potential for providing more efficient utilization of communications links, may provide a partial answer for some carriers.

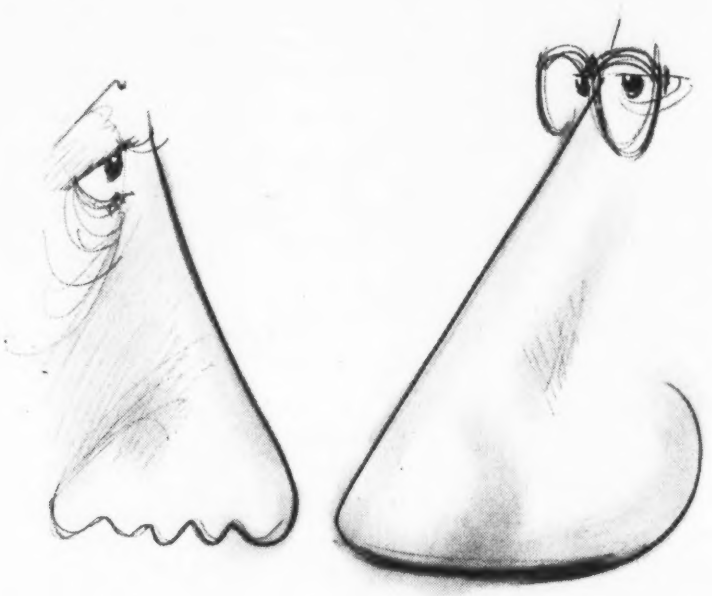
Possible Directions

Some examples of recent trends in communications technology as they apply to airlines will shed some light on possible future directions, although the specific growth paths each airline will take will depend upon the airlines' individual requirements and priorities.

Intertwined in the problem of saturation in communications links are mainframe addressing, polling and terminal response times, and one evolutionary trend relating to all three involves more widespread use of distributed processing concepts.

Under IBM's Programmed Airline Reservation System (PARS) discipline, for example, each mainframe interchange address can serve at least 36 device addresses. An addressing problem arises if fewer than 36 devices are installed at a given location; potential device addresses are

(Continued on Page 78)



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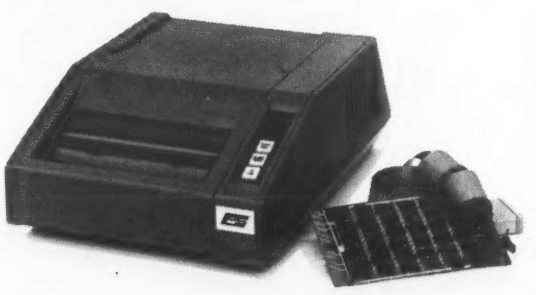

Tek-Com Adds Coupler

SUNNYVALE, Calif. — Tek-Com, Inc. has announced a 0- to 1,200 bit/sec full-duplex acoustic coupler.

The Model TC 3003 acoustic coupler operates asynchronously full-duplex over voice-grade telephone lines and the long-distance direct dial network, according to a company spokesman.

A corresponding auto-answer modem, Model TC 4004, will operate at 0- to 1,200 bit/sec when a TC 3003 is used at the remote location. Both models are compatible with the Bell 103-type modems at 300 bit/sec.

Price for each unit is $695, with 40-day delivery.

Tek-Com, Inc. is located at 1143 Sonora Court, Sunnyvale, Calif. 94086.

Chain of Fireplace Shops Claims POS System Saving Time, Money

COLUMBUS, Ohio — King's Row Fireplace Shops, Inc., headquartered here, has "saved a lot of time and made cumbersome and difficult jobs easy" with Point-of-Sale Business Systems, Inc.'s POS system using Digital Equipment Corp. equipment.

Although the firm is still in the process of incorporating programs into the system, Rich Kelly, general manager of the company, claimed the system is already saving not only time but skilled people. "With our manual general ledger system, you had to have quite a knowledge of what you were doing. Now we can simply summarize the information and give it to somebody to input into the computer and it sorts it all out for us," he said.

The retail company uses NCR Corp. 250 cash registers in its 14 stores. "Each store sends in transaction records on cassette every day and POS Business Systems was able to couple the NCR 250s with DEC equipment so it could read the cassettes. Now inventory is automatically recorded — there's no manual work in it at all," Kelly said.

The hardware installed at King's Row is the PDP-11/03 CPU with 32K MOS memory, 10M-byte disk storage, two VT-52 CRTs, an LA-180 line printer, time-sharing monitor and POS interface.

The system, installed since December 1977, is presently being used for inventory, payroll and general ledger, Kelly said. Accounts payable and accounts receivable are in the process of being installed.

Kelley has no major complaints about the system and would "very definitely" recommend it to other companies, he said. The only problems occurred shortly after installation when software gaps became evident, resulting in frequent "breakdowns" of the system, he said. "While we thought the program looked good on paper, in practical use it was not good. When it broke down, we'd have to wait five days for them to come out and correct it, with work backing up in the meantime." He called the problem "really minor compared with the whole situation."

Kelly said he has no specific upgrading plans at the moment because he is "pretty thoroughly set up." He added, "We probably will in the future because there may be something else I don't know about now."

Cost of installing the system, including all software and excluding the cash registers, is $50,000 or $1,115/mo for five years.

Better Nets Helping Airlines Cope

(Continued from Page 77)

wasted in the airline's computer.

That problem can be expected to become more severe as reservations networks, for example, are expanded to include more and more travel agencies, which typically require fewer than six devices.

The problem is compounded by the time required to poll each interchange on a network, and that polling time, in turn, affects response times at each terminal device. The effect becomes greater as traffic on the network increases.

An intelligent communications line control unit can relieve the mainframe processor of the need to poll each interchange on a network. Linked to the mainframe, this controller represents one or more interchange addresses yet is able to handle multiple downline circuits with multiple interchanges on each.

All the device addresses on their individual interchanges may be mapped into device addresses of the host interchanges, using address translation techniques. That eliminates the problem of wasted addresses.

Polling Process Speeded Up

By polling the downline interchanges at a higher and independent rate than the mainframe would have been able to poll, and by transmitting to the mainframe only when a terminal connected to an interchange that is downline from the communictaions line control unit has traffic to send, the communications line control unit can speed up the polling process by as much as a factor of three. That maintains efficient terminal response times.

The key to the capability, however, is software rather than hardware, and advances in software technology will likely determine the future of airline communications. Software can complement a remote terminal capability, for example, by allowing downline terminals to function as if they were locally connected to the mainframe.

Unified communications networks may prove to be the ultimate requirement for meeting the expanding computer and communications needs of domestic airlines.

Sidney F. Quint is director of marketing, transportation at Raytheon Data Systems, Norwood, Mass.

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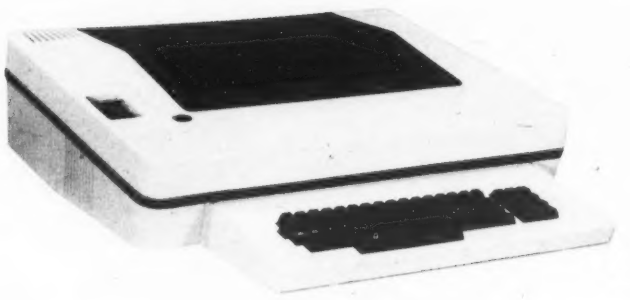
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Telpar Builds Micro Printer

ADDISON, Texas — A full-duplex I/O printing terminal, the T-48C, has been announced by Telpar, Inc. for use with microcomputer systems.

The printer, the PS-48C, is a 48-column, self-contained, Ascii-coded device utilizing an F8/3870 single-chip microprocessor as the system interface and controller, according to the company.

Operation is possible in any of four modes: TTL parallel, TTL serial, RS-232C serial and 20mA loop serial, a spokesman added.

The PS-48C operates interactively, printing one character at a time as characters are received. Print format is a 5 by 7 dot matrix and the throughput rate is 24 char./sec, the firm said.

Where requirements exceed 48 columns, the system automatically prints on the next line, the spokesman noted.

The KB-59C keyboard is formatted for both Teletype and typewriter capability. When interfaced to the printer, it results in a full-duplex, I/O terminal with bit-serial input and output.

Printer Features

Features of the PS-48C printer include no ribbons or ink; 96 Ascii characters, both upper and lower case; signalling rates of 110- or 300 bit/sec in serial mode and up to 960 char./sec in parallel mode; local line feed for advancing paper; and parity check (odd, even or none).

The T48-C terminal is priced at $888. The PS-48C printer is $666, with the KB-59C keyboard offered at $222.

OEM prices for these products and the printing mechanism, with or without interface, are available from the company at 4132 Billy Mitchell Road, P.O. Box 796, Addison, Texas 75001.

Terminal Helps Price Dream Home

TORONTO — A terminal-based "design-a-home" system developed by the Residential Group of The Cadillac Fairview Corp. Ltd. is helping to make it easier for house hunters in the Toronto area to find and purchase new homes.

The free service, first demonstrated at the Canadian National Home Show here in April and believed to be one of the first offerings of its kind in North America, allows prospective buyers to use a Data 100 Corp. terminal system to design a home to match their specific needs.

By key-entering answers via the system's keyboard to statements displayed on the system's CRT screen, buyers are led through a series of 21 questions regarding on the type of house and type of options they want.

After computing an "estimated" price for the home by comparing the buyer's responses to a table of statements stored on the system's 5 million-character disk, the terminal system prints out the full set of questions and answers on an attached printer.

At this point, the system asks a series of personal questions about the applicant's lifestyle and financial situation. The system then calculates and prints out the "estimated" price of a home which the buyer can comfortably afford.

If the cost of the dream home is more than what the buyer can reasonably afford, the system allows the buyer to reenter information into the terminal and redesign the home to fit the affordable price range.

By preprogramming the system to accept certain responses and reject other out-of-range conditions, the entire design process takes less than two minutes.

"It's quite simple," according to Glenn Robeson, manager of systems and procedures for the Residential Management Group of Cadillac Fairview and the man responsible for designing the program (in cooperation with the sales department). "If the buyer says that he is not married, the system eliminates any further questions about the buyer's spouse.

Cadillac Fairview expects to customize the service to adjust for varying real estate values in other Canadian cities.

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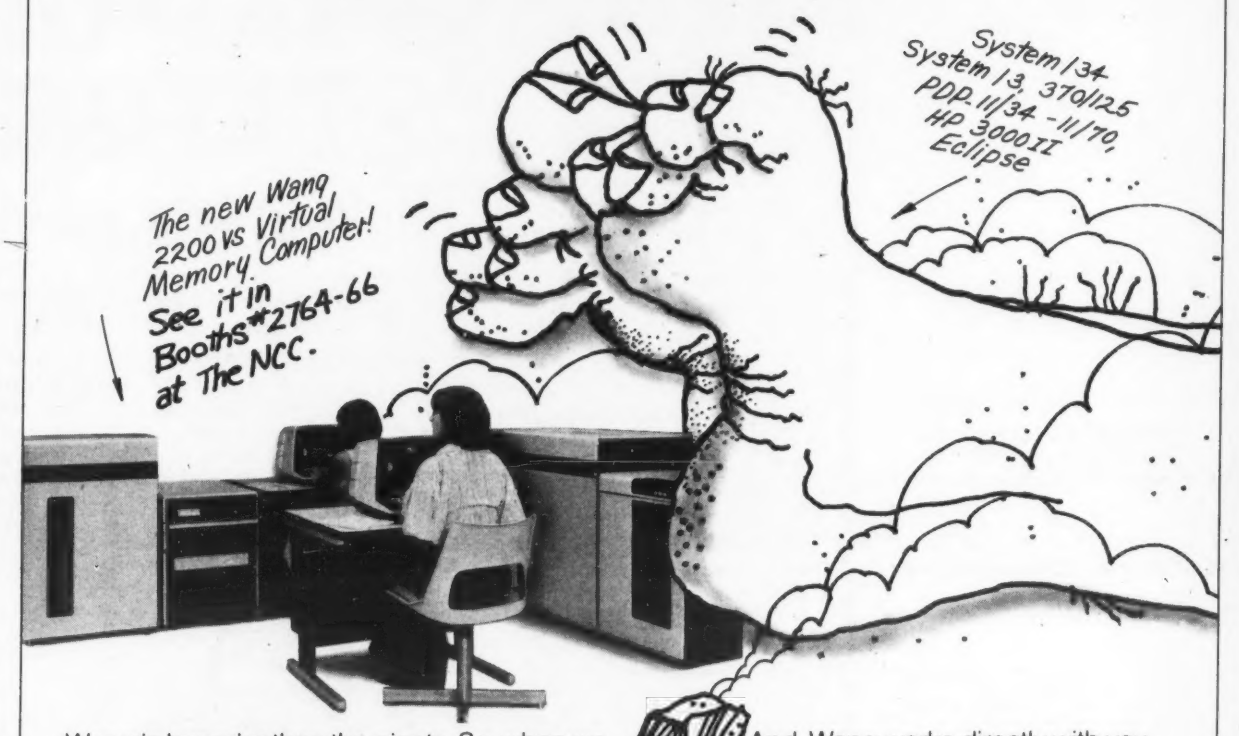

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Calma Has Erasable Display for Graphics

SUNNYVALE, Calif. — Calma Co. has developed an erasable display option featuring a 21-in. video monitor refreshed from a solid state memory for interactive graphics systems.

The Vector Memory Display (VMD) is being offered as an option for all Calma computer-based design, drafting and mapping systems, according to a company spokesman.

VMD provides a 40-foot-lambert image and such features as selective erase, pan and zoom and instantaneous context switching, the spokesman said.

Selective erase allows screen graphics to be deleted or modified and the effect is instantaneously reflected on the screen, the firm said.

The pan and zoom capability allows the designer to move the image smoothly across the screen, to zoom in on the image to inspect the fine structure or to view the total design.

Instantaneous context switching enables the designer to add or delete a layer in the view, the firm said. It also means that "menus" can be added and deleted instantly, under the control of the designer.

VMD incorporates up to four 64-word, 16-bit memory boards jointly developed by engineers at Calma and Intel Corp. The vector memory is capable of holding enough vectors to represent a schematic, printed circuit board layout or mask for a complex integrated circuit, the firm claimed.

The system uses a conventional digital television imaging system, but incorporates a very large memory as well, the spokesman said.

The user loads the vectors into memory and, whenever he wants to change the picture, rewrites the raster memory in real time from this data. Data in the raster memory is refreshed in 25 msec and then continually refreshed onto the monitor, the spokesman claimed. The image continually refreshes itself at 40 frame/sec, according to the firm.

The option can be added to certain existing Calma-based systems, the spokesman said, with the price dependent on software. The price for a typical configuration, including the option, is about $250,000. Such a configuration would include a CPU, magnetic tape, at least one disk and three input stations.

Calma is located at 527 Lakeside Drive, Sunnyvale, Calif. 94086.

Modem Handles dc Links

ISELIN, N.J. — Siemens Corp. has introduced the Modem N10 for transmission over dc-coupled two-wire or four-wire lines. The unit is suitable for speeds to 19,200 bit/sec according to the firm. Like other modems operating in the voice frequency band, N10 may be used for speeds of 200-through 9,600 bit/sec.

The N10 features a new type of balancing network for two-wire duplex operation with high-speed balancing option, the firm claimed. No extra measuring instruments are necessary. It is capable of multipoint operation for a large number of stations and includes a test facility to check that equipment is functioning properly, a spokesman said.

The Modem N10 employs binary dc keying for transmission, a method that is used in high-level termination systems for telegraph networks.

The Modem N10 is packaged in a flat case with the basic circuit plus power supply and the send-and-receive facilities arranged on a large-size board. A balancing circuit, synchronizing frequency clock and scrambler can be installed in the field; their plug connectors are provided, according to the firm.

OEM price for the unit will be in the range of $730 when the modem is available in the fall of 1978. Delivery will be in 30 to 60 days.

Systems are available from the Data Communications Department, Siemens Corp. 186 Wood Avenue South, Iselin, N.J. 08830.

TNI Adds Converter For Magnetic Cards

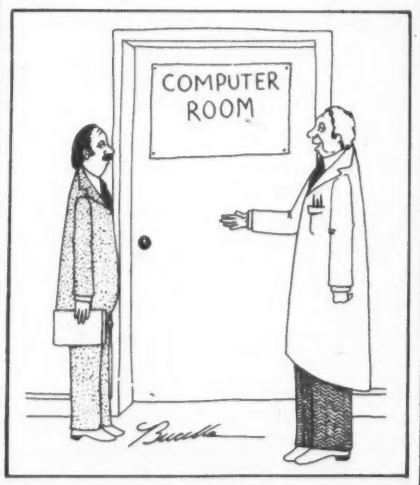
CHICAGO — Telesystems Network, Inc. (TNI) has introduced an IBM magnetic card converter with an RS-232C interface cable that will permit it to be interfaced to any appropriate port or communications terminal, according to the company.

The TNI 202 converter will accept single- or double-sided cards and read them into the target system at a rate of 500 card/sec or about 10 seconds for a full (5,000-character) magnetic card.

The converter can run a teletypewriter system by punching tape or communicate card contents to any word processor, computer, typesetter or optical character recognition system equipped to accept its interface, the firm said. It uses 115V ac current.

Priced at less than $5,000 including 90-day warranty, the TNI 202 carries a service contract which is available for $40 a month.

Telesystems Network Inc. is located at 410 N. Michigan Ave., Chicago, Ill. 60611.



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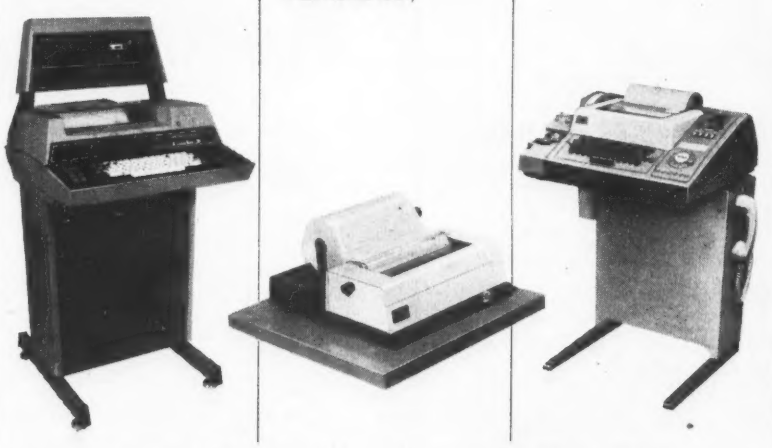

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THE "WAVES" IS HERE!

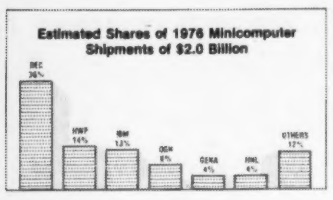
Charles P. Lecht's new book, *The Waves of Change,* is off the press and ready for shipment. It incorporates the serialized excerpts that appeared in *Computerworld* between April and October, 1977, with significant updating and revision, brand new material not previously published, and a host of informative illustrations.

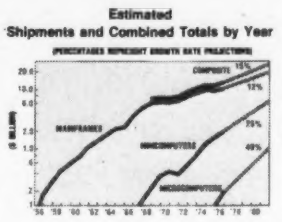
The Waves of Change presents a global view of the data processing industry, assessing the technological and economic currents by which it has been, is, and (in the author's extensively documented opinion) will be directed in future.

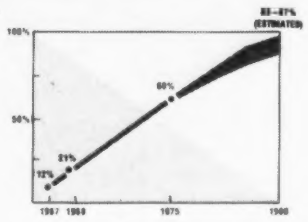
Furthermore, it accounts for the impact on developments in the DP field of the psychology of both users and vendors. Patterns of thought and perception, and the ways in which such patterns manifest themselves through judgments affecting the direction taken by technology and product planning strategies, are certainly at least as vital to our understanding of the state of the DP art as are the purely "technical" breakthroughs themselves.

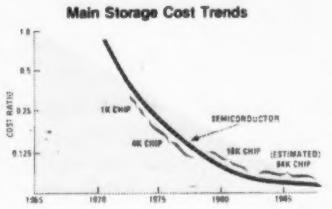
The Waves of Change addresses developments in the hardware and software realms —both single events and "trends"—at length. It explores the competitive positions of manufacturers, the middle- and long-term impact of the burgeoning mini/micro families, the problems faced by corporate management in assessing the role of hardware/software usage methodologies (and the value of specific systems) as these apply to their particular needs, and many other subjects of intense interest to all who are affected by DP.

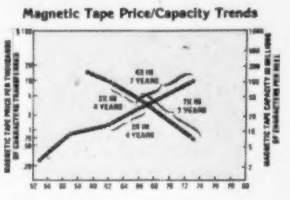
The Waves of Change is a series of wide-ranging essays united by a dual sense of purpose: to assist the reader in evaluating where we are (and why); and to provoke him to consider the implications of rapid change upon his ability to adapt and survive.

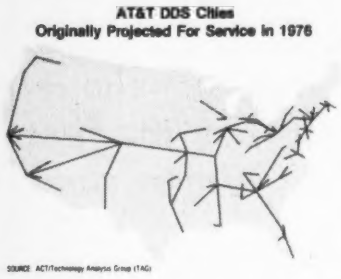












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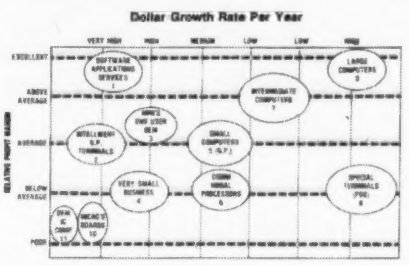

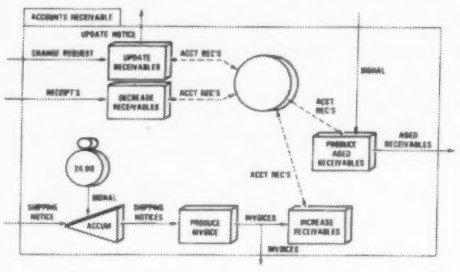

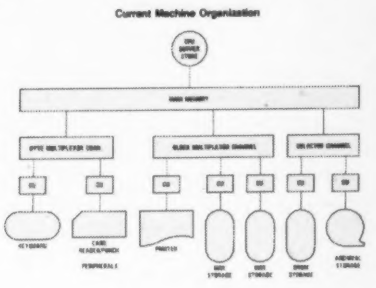

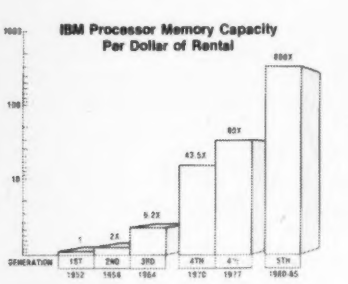

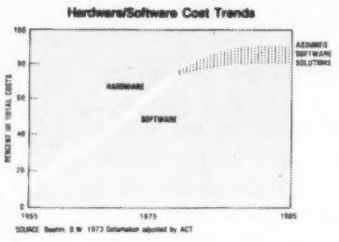

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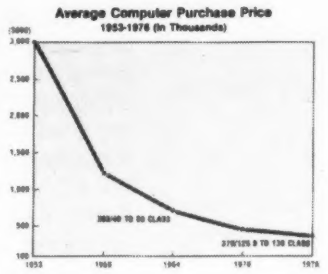

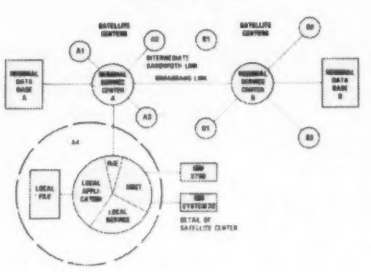

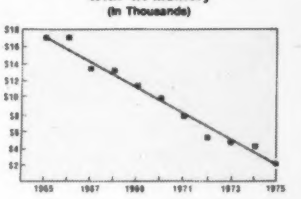

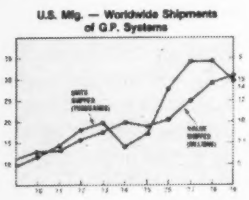

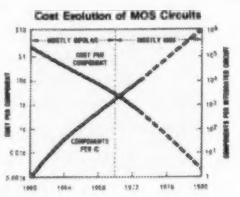

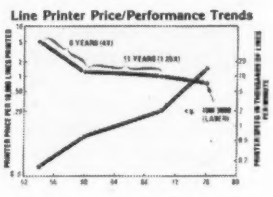

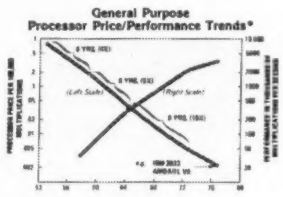

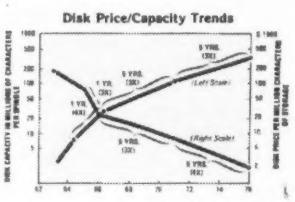

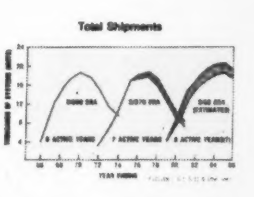

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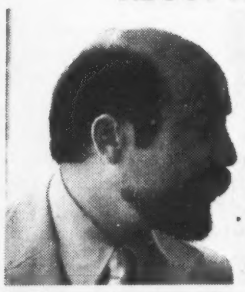

Charles Philip Lecht is founder, President and Chairman of the Board of Advanced Computer Techniques Corp. (ACT), a computer software and consulting firm.

Lecht holds a B.S. in mathematics from Seattle University and an M.S., also in mathematics, from Purdue. His involvement in the computer field extends back to 1951, making him an "old-timer" in a very young industry. He founded ACT in 1962. Since then the company has grown from a one-man show to an international complex employing some 400 persons.

Lecht is a noted speaker and author whose books, in addition to *The Waves of Change,* include three on computer languages and one on project management.

Lecht is a member of the **Young Presidents Organization, The Hudson Institute,** the **DPMA,** the **ACM** and the **New York Academy of Sciences.** Profiles of him have appeared in the *New Yorker* and *Datamation.* Recently, he has been asked by the CBEMA to argue its case against the proposed I/O interface standard before the Brooks Subcommittee of the U.S. House of Representatives.

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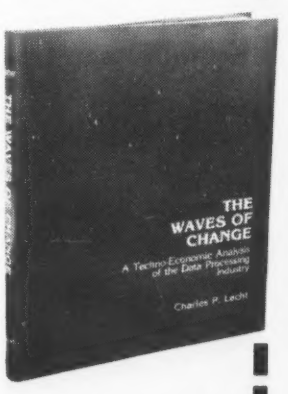

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IN DEPTH
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TSUNAMI

By Charles P. Lecht

IN DEPTH

The future preeminence of U.S. computing is not assured, the president of Advanced Computer Techniques Corp. believes. Attempting to gain "a fresh perspective on the whole technical/financial/psychological/political picture in the U.S. by going abroad and looking back over our shoulder, as it were," Lecht here offers the first half of an overview of the German computer industry.

PREFACE

This installment of *Tsunami* is the first of two to address the subject of the Federal Republic of Germany (FRG) and its role in the DP cosmology. It warrants repeating here that our intention in singling out particular foreign theaters of DP activity and competition for exploration in *Tsunami* is broader than merely providing the reader with technical and economic survey material (although that certainly plays an important part).

A large part of our design in this book is to give the reader (and ourselves) the opportunity to gain a fresh perspective on the whole technical/financial/psychological/political picture in the U.S. by going abroad and looking back over our shoulder, as it were.

Part I of Chapter III seeks to establish a general framework within which to set forth the historical, technological and philosophical place of the computer industry in the FRG — more often referred to throughout this chapter as Germany. We devote ourselves especially to defining Germany's position in the world's computer manufacturing community, giving special emphasis to its relationship to that of the U.S. (and Japan, for reasons which will become clearer as we proceed).

Part 2 will tune to a finer focus on the details of Germany's present technoeconomic profile. We will accomplish this objective by singling out a number of companies that produce computer systems technology and applications in Germany today.

CHAPTER III
Part 1

On the first day in May 1978, a day of celebration for most of the world's population, a communique was received by Advanced Computer Techniques Corp.'s Technology Analysis Group in New York City[1]. Entitled "Fujitsu's Push Into EEC[2] Market: Joint Business Agreement With Siemens to Confront IBM Dominance," it said.

On the 27th of April, Taiyu Kobashi, President of Fujitsu (Japan's largest computer manufacturer), announced that Fujitsu and Siemens, the largest domestic computer company in West Germany, had reached an agreement on joint marketing of Fujitsu's ultra large-scale computers throughout the EEC market. A contract confirming this association will be officially signed this June, following a detailed study of the agreement. Thus, after six rocky years of negotiations, the computer industries of Japan and Europe will unite to form a viable offense against IBM.

This agreement will represent the first entry of Japanese ultralarge-scale computers into the European market and, as a by-product, will surely stimulate Fujitsu rivals Hitachi and Nippon Electric Co. [NEC]

The terms of the agreement are said to be that :

1. Fujitsu will export IBM 370 series-compatible machines on an OEM basis to Siemens which will, in turn, market and support them under the Siemens brand, thus strengthening Siemen's Large Systems Division.

2. Fujitsu will purchase Siemens laser printers and other equipment and combine them with Fujitsu large-scale systems.

3. Fujitsu will offer its technical support in joint development of software.

The agreement will enable Fujitsu to penetrate a market (i.e., the EEC market) three times larger than that of Japan. Fujitsu will thus have secured its grasp on an important, new steppingstone in the computer export industry, beyond that represented by its earlier capital involvement in Amdahl Corp.

Siemens has been suffering from a deficit in its Computer Division since the establishment of Unidata as an intended challenge to IBM's strong dominance of the European market. One of the weaknesses in the Unidata venture had been that Unidata did not develop/manufacture large-scale computers. By means of this new joint venture business agreement with Fujitsu, Siemens now plans to mount a serious, well-equipped assault on IBM's premier position.

The joint business plan had a prior, indirect but unsuccessful expression in the relationship obtaining between Furukawa and Fuji Electric; Fuji Electric was formed jointly by Furukawa and Siemens, and is Fujitsu's parent company as well.

The plan was revived in earnest yet again a year and a half ago, triggered, perhaps, by the downfall of Unidata and IBM's subsequent announcement both of its 30 series and of price cuts on its current models. The agreement finally announced last month embodies a new commitment to "go ahead," in concrete terms.

The literal interpretation of this communique makes it quite clear Germany has no intention of remaining the captive market of U.S. computer systems manufacturers that it has been for more than 25 years. It also suggests the emergence of other phenomena whose implications reach beyond the mere loss of business the U.S. computer industry could suffer as a result of a Siemens/Fujitsu (and possibly Amdahl) venture.

Although the Siemens/Fujitsu announcement did not mention Amdahl, reliable sources maintain Siemens-Amdahl negotiations are under way. Because I believe it inevitable that Amdahl will participate in the venture, it is referred to throughout this chapter as the Siemens/Fujitsu/Amdahl venture.

Between the Fujitsu M180-II and M-200[3], the two systems in direct competition with IBM's 3032 and 3033MP, lies a 5-Mips gap begging for Amdahl's 470V/6-II (if not a Siemens 7.700).

Anyway, it is a credit to both Amdahl and Fujitsu management that they appear to have discovered each other and the first clear alternative to IBM in the large systems area — the same product at a cheaper price (or, as IBM might claim, enjoying the advantages of an indirect IBM subsidy).

There may be some merit to the argument of those who associate our loss of industry leadership to the Japanese connection through which such firms as Amdahl and, say, Itel, have been revitalized. But any criticism of these companies for "helping the U.S. to succumb" strikes at the heart of our free enterprise system and is therefore unwarranted.

Since the U.S. government is without a clearly expressed policy regarding its computer industry's value to our national economy and defense, the Fujitsu/Amdahl type of involvement is no real surprise — we can only admire it, even if it happens by accident. Dr. Gene Amdahl himself might agree that his company's deep entanglements with Japan's computer industry leader could move even the strongest U.S. competitors to cry "foul" as they cope with the enormous pressure of competition from Japanese products — at home, no less. Now, with Siemens joining the team, the competition will have cause to cry "foul" yet more frequently.

I draw the same conclusion that I know every fair-minded American, including Dr. Amdahl, would: Fujitsu's support of Amdahl simply demonstrates the Japanese are more intelligent than we are — in the private as well as the governmental sector. In view of this, it's good to know that, should the balance of power in electronics output ultimately favor Japan, we have in Dr. Amdahl at least one more link of goodwill in the web of friendship which binds us.

A recent *Fortune* article stated, "Overall, in 1977, the nation [U.S.] took in $2.95 billion in fees and royalties on transfers of technology — quite an increase from the $666 million in 1965. The U.S. surplus on technology exchange last year ($2.95 billion less the outflow of fees and royalties for foreign technology) amounted to $2.67 billion. That was not so very much less than the $3.25 billion trade surplus the

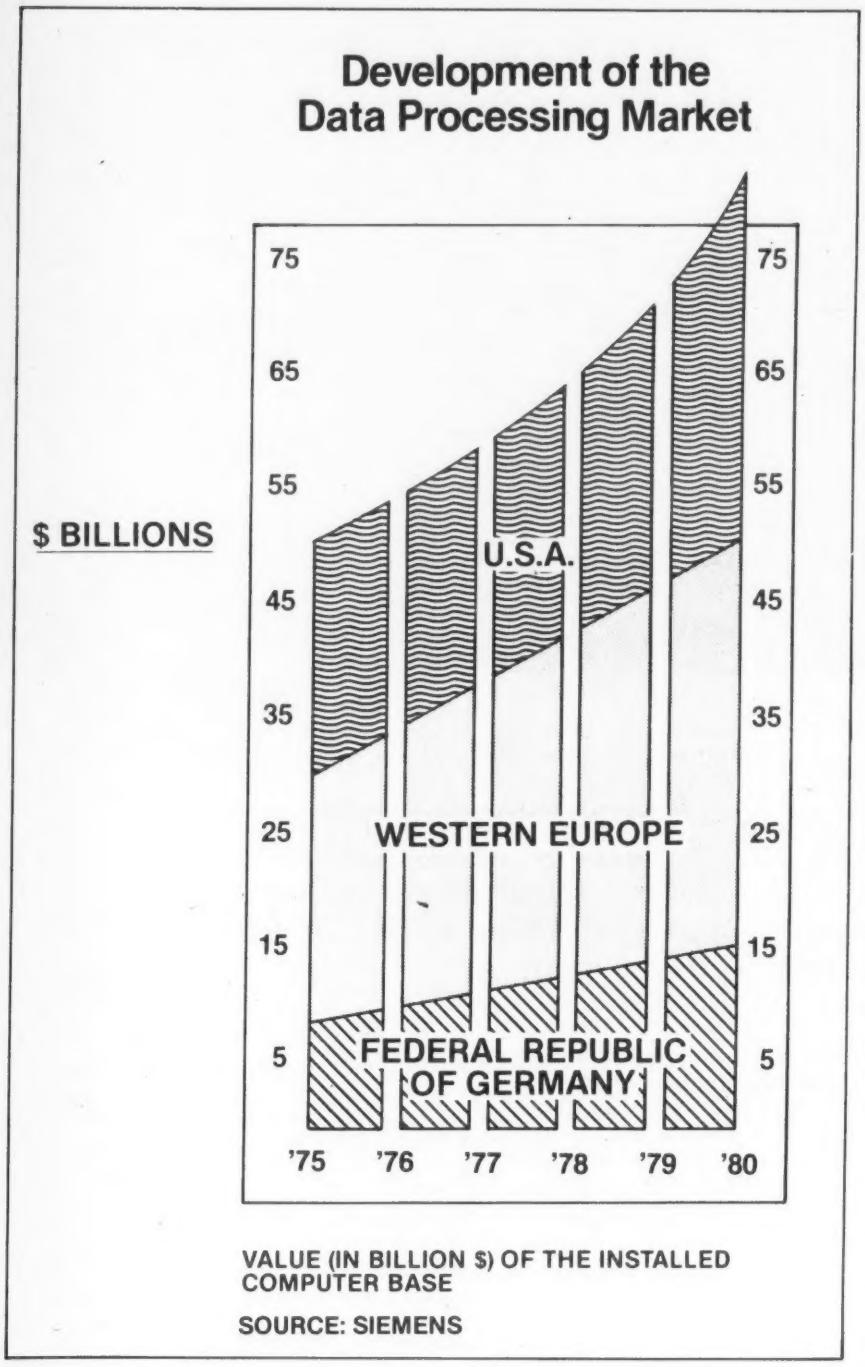

Figure III-1. The value of the installed general-purpose computer base (excluding minis and special-purpose systems) in the FRG should nearly double (to $15 billion) by 1980, up from about $8 billion in 1975. At that time the German market may represent 18.5% to 19% of the combined U.S. and Western European installed base.

U.S. earned last year in all manufactured goods."[4]

U.S. business in general can hardly afford a further reduction in that specialized sector responsible for the main (and majority) contribution to a balance-of-payments surplus. The introduction of competitive large-scale, non-U.S.-manufactured processors in Western Europe by Siemens will help to do this.

However reluctant we may be to consider the consequences to us of the loss of our current, but eroding, position of world leadership in computer technology, it would nevertheless be prudent to do so. Thus far, our concern seems to have been limited to the danger of unwitting transfers of technology to belligerent nations or their allies. But the impact of losing the R&D funds that are available to the scientific community only in the presence of a balance of payments surplus is equally grave.

In point of fact, such funding fell from 2.8% of the gross national product in 1968 to 2.25% in 1976, according to National Science Foundation figures. Ultimately, this translates into a real drop in effective spending for our national defense.

Since computer systems are acknowledged to be critical to the waging of war (or the ability to do so) in the 1980s, it is clear enough that we can maintain our military preparedness only by arresting the vicious, downward spiral of market share loss that leads to R&D reductions and therefore to fewer advancements in critical areas of technology and, finally, to an impaired defense posture.

Germany's newly reinvigorated, home-owned computer systems industries are especially important after Japan's. Recent developments suggest a highly underrated German capability in computer systems development and manufacture.

And although not primarily home-owned, the impressive number of systems developed and/or manufactured in Germany by German people primarily for use in Germany (over 80% of Germany's DP needs are met by German-based manufacturers) suggests a degree of self-sufficiency to which even the Japanese might yet aspire.

The recent success of German minicomputer manufacturers clearly demonstrates their self-sufficiency in this range of systems (they now hold more than 60% of their own marketplace, worth over $200 million, while exporting almost 60% of the value of their production). In the small- to large-scale general-purpose systems range, German-based (though not primarily German-owned) manufacturers account for greater than 85% of the total marketplace.

Siemens is the lone, German-owned manufacturer controlling a sizable segment of the German marketplace (20%, through products in the small to medium-range marketplace) with its nearly plug-compatible IBM 370 115 through 158 systems (models 7.722-1 through 7.760 and pending 7.770). Virtually all large systems (IBM 370/-158 class and upward) are made in Germany or exported to Germany by U.S. manufacturers.

Germany's total computer systems marketplace (approaching $2 billion in annual shipments, including peripherals), so long dominated by U.S.-owned manufacturers, is thus to undergo siege by the impressive Fujitsu/-Amdahl product line through Siemens. (In my opinion, Siemens could not have picked better friends with which to siege.)

Further to this point, IBM, Honeywell Information Systems, Inc., Univac and the other large mainframe manufacturers stand to lose ground in the EEC in particular and Western Europe in toto, not to speak of Germany. The still swelling tide of U.S. domination by which the EEC and Western Europe computer systems marketplace has for so long been overwhelmed may thus be about to turn and to ebb (see Figure III-1).

Star on the Rise

That Germany's star as a technological power is on the rise is clear to anyone who has watched the recent German-owned computer system manufacturer community recover following 20 years of unimpressive growth and a series of late 1960s, early 1970s partnership traumas. The establishment of a viable computer systems business controlled by German-owned enterprise has to some extent suffered from its postwar dominance by just about every important technology-exporting country in the world.

Unlike Japan, a technological prodigy geographically isolated in a sea of comparative underachievers, Germany in modern times has lived cheek-by-jowl with countries which are on a par with it in development. Thus, during the period of its reconstruction in the '50s and '60s (the first 20 years of the computer era), the German computer systems marketplace, although hobbled by the same kinds of retributive trade and production agreements as Japan, saw much more real contention by non-German manufacturers than did Japan. Even such nontechnology-bound factors as the cost of freight transport to Germany from technology-exporting countries strongly influenced the path Germany was to follow, as contrasted with that open to Japan.

With its production base undergoing redevelopment following its destruction and/or removal (the Soviet Union carried off whole manufacturing plants), the Germany of the last 25 years, surrounded by a supermarket of competing technological products, had more options than did Japan when faced with make-or-buy decisions. Quite naturally, Germany felt less compelled to invest its hard-earned deutsche marks in the establishment of a home-owned computer industry

(Continued on Page 85)

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More than a computer company

(Continued from Page 83)

than did Japan yen in their own.

Figure III-2 shows the still-increasing DP imports by Germany until 1974, a year of reversal. The reversal was achieved through the continual heavy investment of foreign (mostly U.S.) capital in German-based production facilities.

In Chapter II, we noted that Japan's urgent need to establish its own home-based computer industry was stimulated by many factors, not the least of which were its lack of natural resources and its recognition that superiority in electronics solved this problem twice over. First, it provided Japan with a heavyweight revenue-producing industry utilizing far fewer resources than would other industries of comparable profit potential. Secondly, through electronics, technical difficulties in development of synthetic replacements for natural resources might be overcome.

Certainly, lack of scientific ingenuity or industriousness among the German people was not the cause of Germany's choice of direction, for history has proven otherwise. Thus, subject to an intense bombardment of products from advanced Western countries as well as from the Far East, and tempted to buy time to regenerate its war-shattered electronics industry, Germany seems to have exercised a reasonable, even "constructive," option in letting its home-owned computer industry lie fallow — that is, until recent days.

Many excellent German companies, while bent on improving their technological base in spite of limited funds, entered into agreements which ultimately proved damaging to their own vitality. For example, extremely talented and highly competitive companies like Siemens suffered through calamitous relationships with such computer systems losers as RCA in America and entered into a potpourri of equally ill-advised, if less significant, agreements with other manufacturers in the U.S. and elsewhere. Nixdorf was only a developer and manufacturer of computer subassemblies for other U.S. and foreign vendors prior to 1968.

The few attempts made by European-owned companies to create a Western European computer industry, as exemplified by the Unidata venture, seem to have resulted in further dissipation of the growing strength of Germany's home-owned computer industry. IBM's heavy entrenchment in German competition through its German-based research, production, marketing and sales support facilities, and its holding of as much as 72% of the marketplace (if-sold value in 1965), further exacerbated the situation (from a competitive standpoint) and further ensured IBM's position as the leading manufacturer of computer systems in Germany today.

That IBM's market share in Germany has dropped (58% in 1977) may be-

(Continued on Page 89)

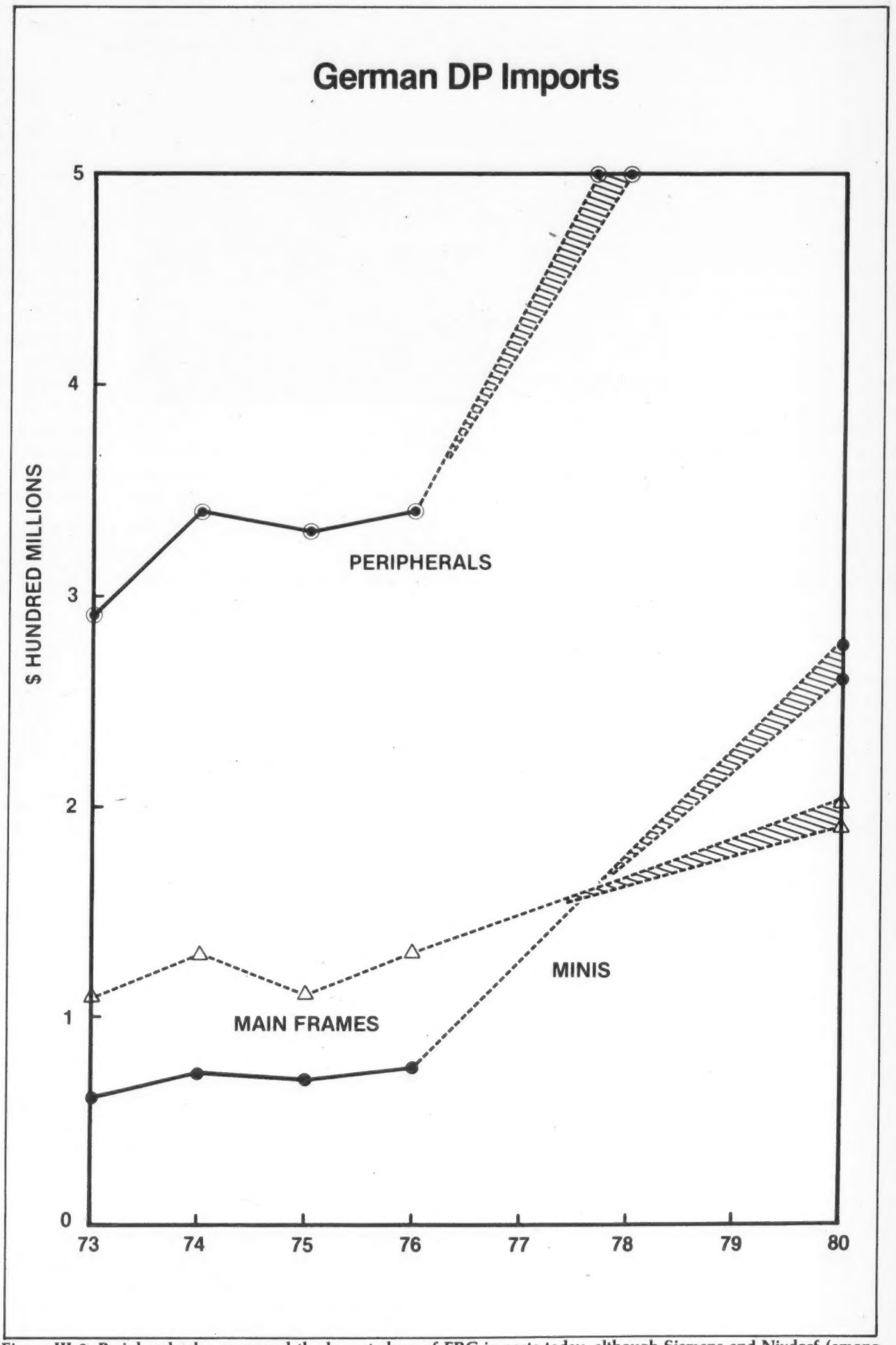

Figure III-2. Peripherals also command the largest share of FRG imports today, although Siemens and Nixdorf (among others) are becoming more self-reliant, asserting their independence from foreign I/O devices. The popular Siemens laser printer, in fact, should become a major DP export product by 1979-80. Mini imports are insignificant at this time, since the domestic manufacturers — Nixdorf and Kienzle — are leaders in their own marketplace. Mainframes represented about 24% (or $130 million) of DP imports in 1976 and are likely to drop to 16% of all DP imports by 1980.

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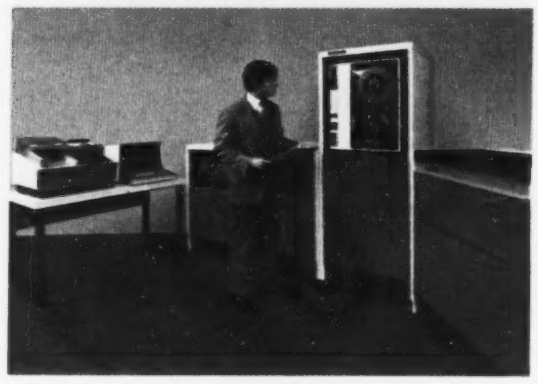

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Harris offers three families of remote batch processing products for entry-level, medium function, and high-function applications: the Harris 500, 1200 and 1600 series respectively. As an example of the product-family concept, our economical Harris 1610 is built around a memory-based operating system, performs remote batch and media conversion and includes a wide variety of proven peripherals.

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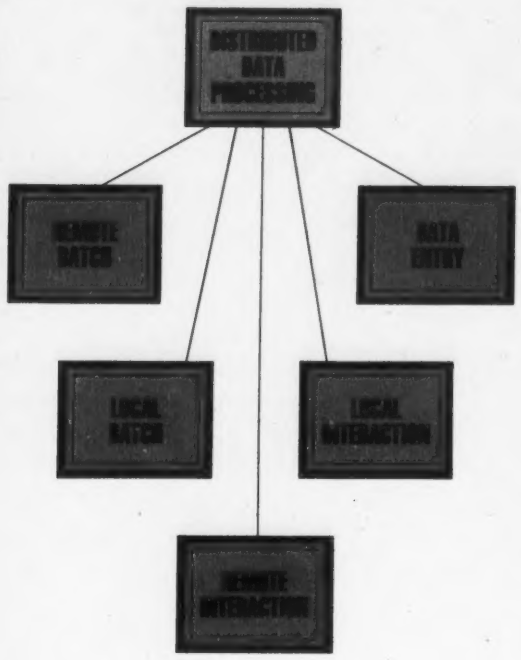
your terminal requirements — batch, 3270-compatible, and data entry — and is capable of growing with your processing needs in all these areas.



The five typical elements of a distributed data processing system.

Sophisticated new HARRIS 1670 distributed processing system offers local or remote batch processing, data entry, and local and remote interaction concurrently. CRTs are individually switchable between local and host files.

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You can choose from two format-driven data entry packages, easily implemented by data entry personnel. The two packages, Format 10 and Format 41, make your data entry jobs simple, efficient and effective.

User-Written Programs (Local Inquiry)

We offer an easily learned, English-like high level programming language (REGAL), for optimized screen management and for applications such as source document capture and interaction with the local 1670 data base. CRTs running REGAL programs can be located either at the 1670 site or remotely. Additionally, the CRT can control station printers to produce required hard copy.

Remote Inquiry (3270-Compatible Interaction)

This capability enables the CRT operator to connect through the 1670 to 3270-compatible programs at a remote host site.

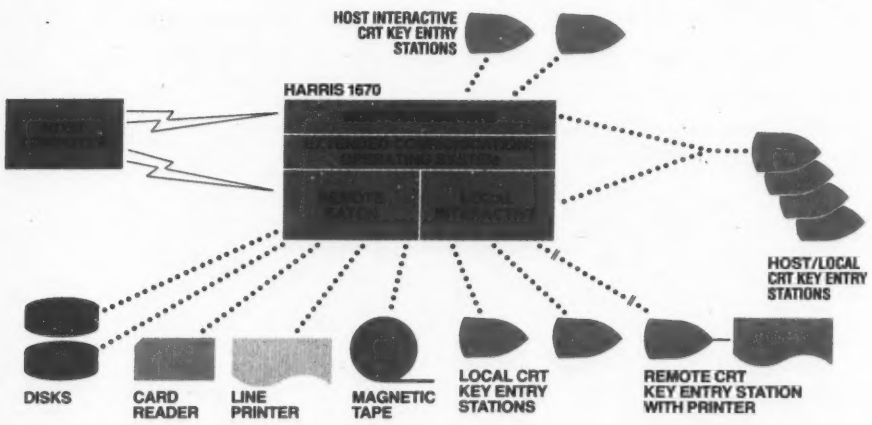
Selectable Mode CRTs can be used to perform operations in the 1670 mode (including data entry and user-written programs), or to switch to 3270-compatible host programs. Switching is controlled individually at each station by the operator, and the system automatically ensures data integrity when switching from one mode to the other. Selectable Mode enables you to off-load the host by performing processing locally for the majority of your requirements, saving host resources for those occasions when data is not stored locally. Compare this feature when you're evaluating distributed systems!

No Changes Required at Your Host

The fact is, both RJE and 3270-compatible applications can be executed using the 1670 with no changes or new investment in host software. What's more, you *continue* to save since we can upgrade most Harris 1600 and 8170 systems to 1670s with minimal disruptions to your operations.

Do It All with Harris

To sum up, there's no need now to shop around for a variety of systems to handle your requirements for remote batch, local or remote interaction or distributed data processing. Start with Harris and you're assured a migration path from the system you need today all the way to one you'll require in the future.



For more information, contact your nearest Harris sales office or: Harris Corporation, Data Communications Division, 11262 Indian Trail, P.O. Box 44076, Dallas, Texas 75234, (214) 620-4400.

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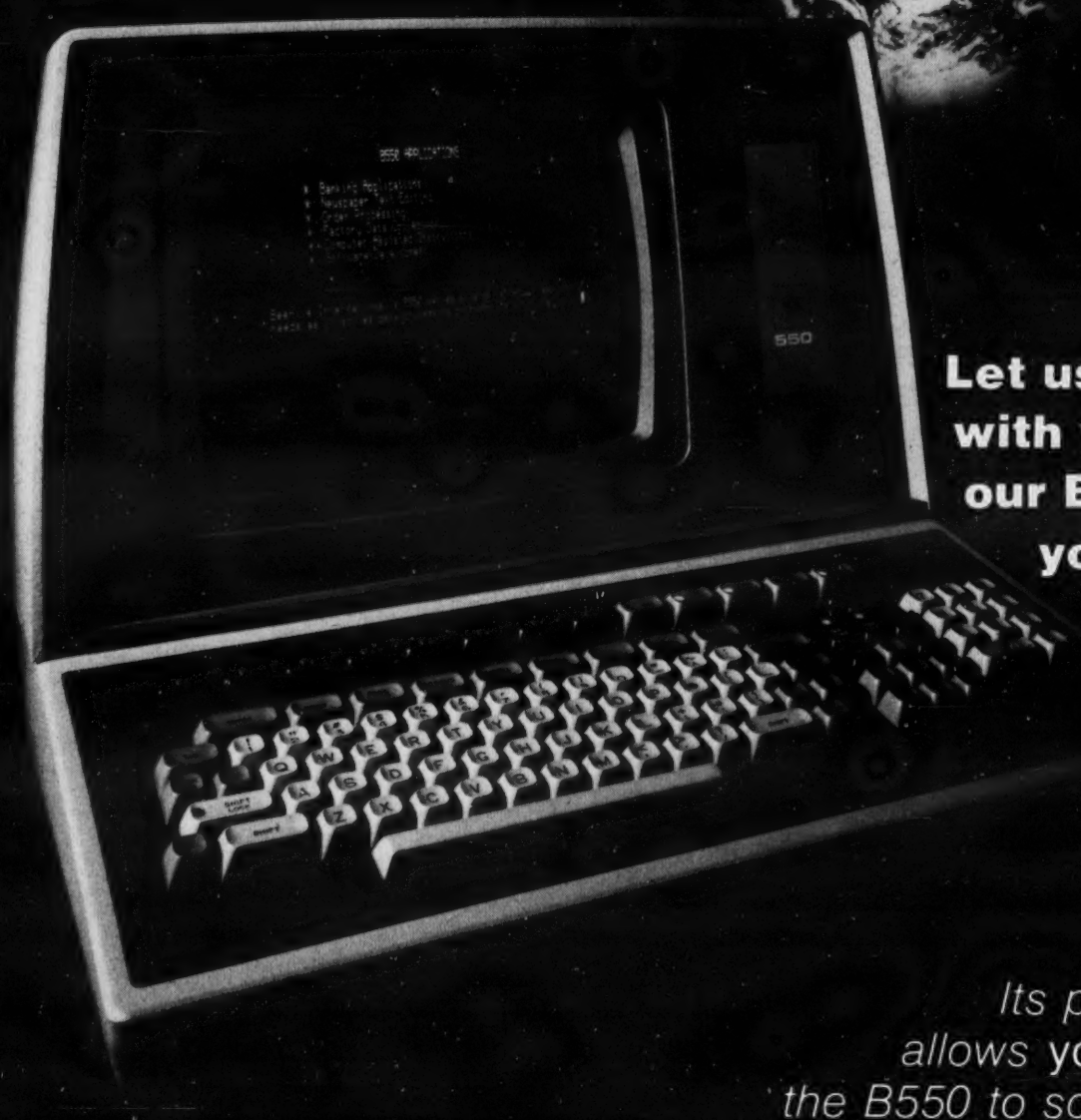

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Its programmability allows **you** *to customize the B550 to solve* **your** *needs.*

Worldwide customer solutions by our B500 series include: ☐ Newspaper Text Editing ☐ Bank Electronic Funds Transfer ☐ Stand Alone Invoice Preparation ☐ Foreign Language Text Preparation ☐ Process Control ☐ Telex Preparation ☐ Airline Ticket Reservations ☐ Factory Data Collection ☐ Word Processing System ☐ Disc Operating System ☐ Diagnostic Testing and many more.

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(Continued from Page 85)

speak less of a diminution of IBM's strength than it does a continuously changing and unfolding definition of both computer systems products and marketplaces[5] in the latter part of the 1970s[6]. That it confirms a rising German ownership of the means to compete successfully in the domestic computer system marketplace is evidenced by the availability of a wide diversity of high-quality, low-end systems emanating from within such companies as Kienzle, Nixdorf, Triumph-Adler and others.

Thus Germany, one of the last of the top four world users of computing equipment to nurture its home-grown, home-owned industry in such a way as to capture truly significant market segments, is now coming into its own; the ebbing of our tidal wave of products into the German marketplace is at hand.

Diminished Dependence

From Figure III-3, it is clear that the Japanese computer industry, through the increase of its exports to Germany, is helping to reduce Germany's still heavy dependence on U.S.-owned industry. It should be borne in mind that in the balance of things, while Japan owns two-thirds of its own computer industry production (it has three "IBMs" including one foreign-owned, home-based manufacturer — see Chapter II), it produces less than it needs to meet internal demand than does Germany.

Thus, the introduction of Japanese systems to Germany through Siemens, while not increasing Germany's home-owned computer industry growth, serves to diminish Germany's dependence upon the U.S., such dependence amounting to 72% in the small to large general-purpose systems arena in 1976 (see Figure III-4).

Accordingly, the domination of the Western European computer systems marketplace by U.S. companies, amounting to over 75%, will diminish too.

Skills Shortage

Assuming German- and Japanese-based (but foreign-owned) plants are staffed by local nationals, the potential of the German computer industry to satisfy its own needs without importing is greater than Japan's (i.e., if the foreign ownership were to leave). With help from Japan, a main area of German technological weakness causing heretofore severe dependence upon U.S. companies is overcome.

Changing technology, a strong mark and weak dollar and a U.S. government unsupportive of its own industry could accelerate Germany's self-sufficiency in computer systems manufacture by German-owned enterprise, especially after Siemens engineers obtain the right to manufacture Fujitsu's IBM-like large processors. All things considered, no other Western European power is in a similar position —

(Continued on Page 90)

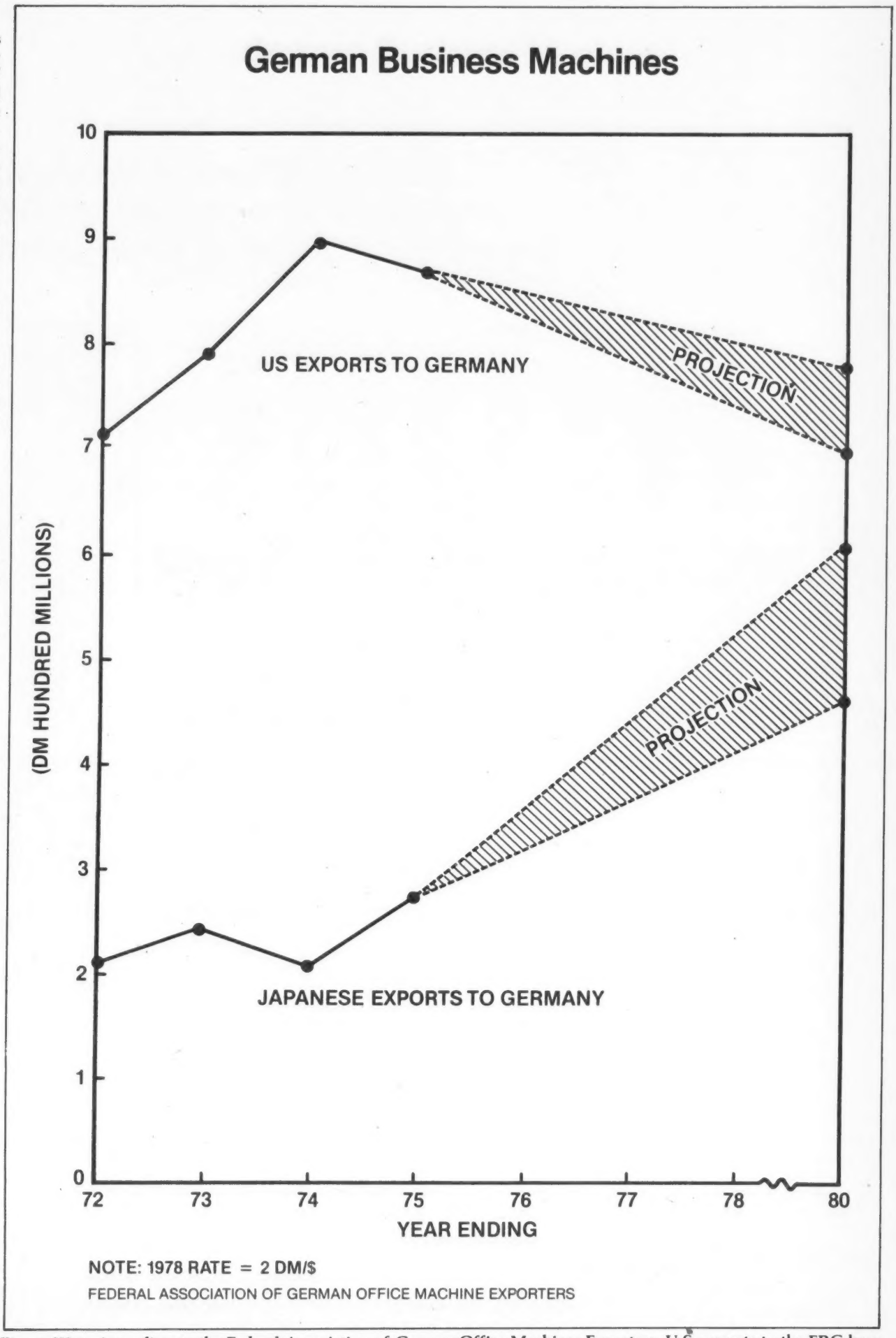

Figure III-3. According to the Federal Association of German Office Machines Exporters, U.S. exports to the FRG have declined from about DM900 million ($450 million) in 1974 to approximately DM850 million in 1975. In contrast, Japanese exports to the FRG have increased from DM200 million in '74 to nearly DM300 million in '75. However, we believe that the recent Siemens/Fujitsu/Amdahl agreements to import "big ticket" ($3 million to $5 million) mainframes to the FRG will not only reinforce this trend, but accelerate Japanese exports to the FRG — so that by 1980 the value of Japanese exports to FRG could well match, if not exceed, the value of U.S. exports.

(Continued from Page 89)

with due respect to our friends in France, England and Italy. But this will be covered in later *Tsunami* chapters.

And, while the shortage of professionals skilled in the design and development of computer systems has at times abated, the general trend has been for that shortage to persist and increase. In view of the explanations we have offered as to why the German-owned computer industry matured so slowly, the existence of such a critical shortage of skills for home-owned industry in many areas of advanced technology should come as no surprise. At this point in time, most top scientists are working for foreign (mostly U.S.) firms.

That those at the forefront of technology, like Siemens, are any less prepared to meet its challenges than their colleagues abroad is clearly not true. The problems are of *number*, not quality of skilled people. This is evidenced by recent German announcements of general high-technology products as well as use by U.S. companies of German know-how.

The Siemens laser printer is no weak competitor in the world marketplace. For example, it is currently purchased by Itel Corp. for resale in the U.S. by Burroughs Corp., Univac (pending), Control Data Corp. (pending) and, of course, Fujitsu. Other firms are likely to follow suit.

Further to the point, IBM elected to develop its new E series system in Boeblingen, its planned worldwide replacement for the once strong, now weak low-end 370/115 and 370/125 systems (also developed in Boeblingen).

E Series Slip

According to an April 27 *Wall Street Journal* article, overzealous IBM-Japan salesmen, apparently untrained in and thus, one presumes, unsympathetic to U.S. antitrust law, violated its requirements for inscrutable silence on the new E series product. Noting a further Justice Department attack on IBM in the U.S. for allowing its Japanese subsidiary to operate according to Japanese tradition, the article went on to say, "In any event the violations . . . have prompted inquiries by Japan's Ministry of International Trade and Industry into possible violations of the Japanese antimonopoly law . . . U.S. antitrust and Japanese anti-monopoly laws seem to be as different as Hammurabic severity is from Rabelaisian generosity.

The IBM E series systems — the product of Germany made by Germans, ostensibly acting as Germans and spoken about (preannounced?) in Japan by Japanese, acting as Japanese — to be officially announced in the first quarter 1979 somewhere, already have the U.S. Justice Department angry at IBM. I wonder if Japan's judiciary would attack Fujitsu if Siemens' salesmen touted a new computer in Germany before announcement in Ja-

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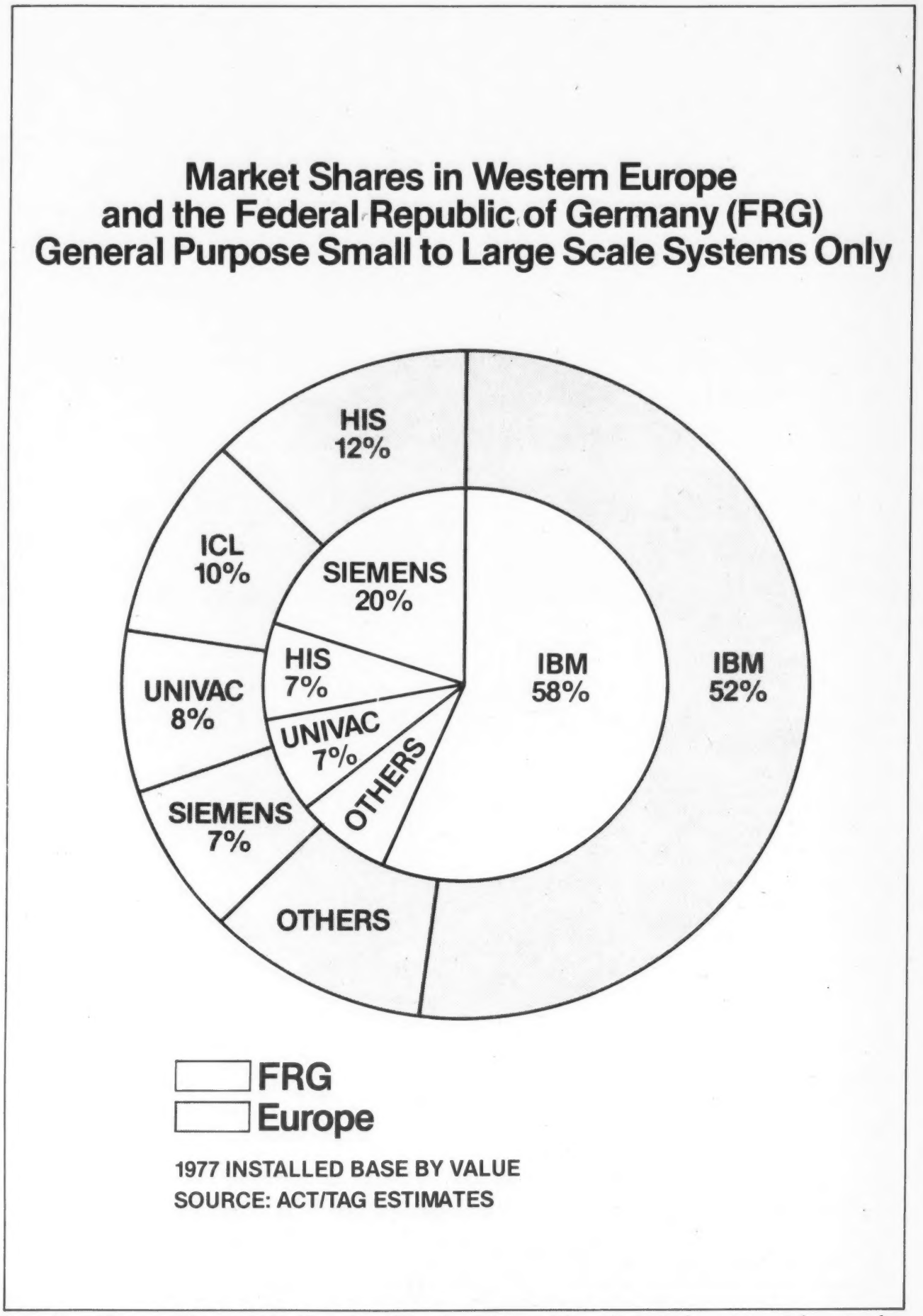

Figure III-4. The year-end 1977 market share chart shows the positions of the major general-purpose mainframe vendors in both Europe and Germany. IBM's market share in Western Europe is about 52% (by value) and 58% in the FRG, down from 72% in 1965; HIS is next with 12% in Europe and 7% in the FRG; ICL controls about 10% on the continent, but its installed base in Germany is insignificant; Univac maintains 8% in Europe and matches HIS with 7% in Germany. Siemens currently holds a 7% share in Europe — primarily the northern countries — and is No. 2 in Germany with a 20% market share. Assuming that the recent Siemens/Fujitsu/Amdahl deal to import very large-scale (IBM 370/168-3-and-up range) mainframes is successful, Siemens' market share should increase dramatically during the next two to three years at the expense of IBM and other U.S. suppliers.

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NATIONAL —SPECIAL LEAR SIEGLER ISSUE—
INFORMER EXTRA
May 29, 1978

AT LAST! THE TRUTH CAN BE TOLD!

SHOCKING REVELATIONS PROVE, BEYOND A DOUBT, LEAR SIEGLER'S PLANS TO DOMINATE THE NCC!

Lear Siegler, Inc., reeling under enormous pressure brought to bear on its mysterious Project X, has finally consented to declassify its hush-hush undertaking.

Overwhelming outcries of the past several weeks have made Project X's continued secrecy impossible, and the INFORMER's relentless war against it was, apparently, too big a burden to shoulder.

At a press conference held late yesterday, a group of high-ranking LSI officials and Project X engineers unveiled the fruits of their months-long clandestine labor. Project X's sealed doors were opened, and the wonder devices were seen and described in detail for the first time. It was an awesome sight, seeing the mechanisms in all their glory, there where they had their mysterious origins. INFORMER reporters noticed several involuntary gasps from others unprepared for the display.

Originally designed to guarantee complete mastery of this year's NCC (National Computer Conference), Project X was, from the beginning, shrouded in secrecy and bedeviled by persistent rumors. Our intrepid undercover reporter, working perilously close to exposure deep within LSI HQ, risked detection constantly in his efforts to leak Project X data. Only through the greatest vigilance and determination was he able to prolong his subterfuge and continue to supply us with information.

Now, however, his perseverance has culminated in success, and Project X is a mystery no longer. Our unflagging campaign against the project, coupled with public outcry, has accomplished what the government was not prepared to do, and the secrecy is over.

Within the pages of this week's INFORMER, the fabulous devices of Project X are reviewed in detail. Now, at last, here is the full story on Project X and the culmination of its labors.

The INFORMER wishes to publicly applaud its diligent, selfless staff of reporters, field operatives, and agents who, through their unceasing efforts, made this moment what it is—the disclosure of Project X.

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LEAR SIEGLER

ADM-31 Proves 2 Pages Are Better Than One

The ADM-31 is a low-cost, high-reliability desktop CRT with full editing, formatting and *two pages of display.* Not as an option, but as standard equipment. Which means the ADM-31 affords twice the display potential of terminals costing up to twice as much. And that's a pretty clever idea.

The ADM-31 is completely self-contained, with a keyboard, control logic, character generator, refresh memory, and interface. What's more, it incorporates a microprocessor which augments its reliability while making it even easier to use. Block transmission and *protected fields* are standard. And the terminal also comes with a printer port option, if you require printouts along with your readouts.

The ADM-31's amazing 90-key keyboard is actually capable of more functions than are now available on the ADM-1. What's more, the keyboard itself is integrated with the main logic, and is capable of generating all 128 ASCII characters (upper and lower case, numerics, punctuation, and control). Among other things, it features an integral numeric pad, with period, comma, tab, minus, and numerals arranged in a familiar calculator format. And it also includes a caps lock key (to lock the keyboard into upper case display).

The ADM-31's editing capabilities let you clear the screen, or use a destructive cursor for a character change. Read and load cursor permits sensing of the current address, and direct, absolute addressing to any X-Y coordinate. The controls let you skip protected fields, backspace, forespace, move up, down, return, home, and new line. And you can store the Control Characters, and they'll display as a reverse image.

The ADM-31 comes with *character insert/delete,* line insert/delete, erase to end of line/field/screen, and back tab. All standard equipment. The ADM-31 can also clear to protected spaces, clear to unprotected nulls, and set and reset copyprint.

Who says a machine can't edit?

Project X's new ADM-31 desktop CRT, seen here with 90-key keyboard and Caps Lock Key. PROJECT X PHOTO

Project X's amazing new ADM-42 is a semi-intelligent terminal designed for a host of computer-related tasks. PROJECT X PHOTO

ADM-42 All But Thinks For Itself

The ADM-42 is a semi-intelligent terminal that gives the user flexibility of format, security, editing, interface, and transmission. Like the ADM-31, it features a full two-page display as standard equipment. And it also comes with an optional extended memory capable of adding data space in 2-page increments up to a maximum of 8 pages.

The terminal boasts a bright, easy-to-read, 2000 character display, a full 128 ASCII character set, 16 function keys for 32 separate commands, and five separate cursor control keys. You can also order an optional Programmable Function Key feature that lets you define the function keys. An alternate character generator with line drawing set is also optionally available.

The ADM-42's status displays on-screen disclose a wide range of information at a glance, and special symbols indicate the entry of all control characters in memory. The ADM-42's Field Protect Mode also allows rapid data entry into forms or instruction pages.

Like the ADM-31, the ADM-42's displayed data is formatted in 24 lines per page, with 80 characters per line. In addition, it offers something the ADM-31 doesn't. It has an 80 character 25th line, established and reserved exclusively for status indicators, or special messages.

An additional special capability of the ADM-42 is Field Blanking/Underline. You or the computer can designate areas of the display as blanked fields, and the designated areas are then blanked from the display. Or an Underline attribute may be substituted for Field Blanking by switch control.

With Field Blinking, you or the computer can designate areas of the display as blinking fields. These areas of the display will then blink on and off.

And with Reverse Field, you or the computer can designate areas of the display as reverse images. These areas of the display will then reverse on and off.

The ADM-42, like all LSI products, is upward compatible. That means when you upgrade to the ADM-42, you don't worry about rewriting your software, or replacing any other peripherals. Just plug the ADM-42 into the system you've been using all along.

You'll discover this terminal is a truly efficient, cost-effective step upward that'll enhance your system out of all proportion to its price.

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REVEALS ALL!

Ballistic Printer™ Tougher In The Long Run

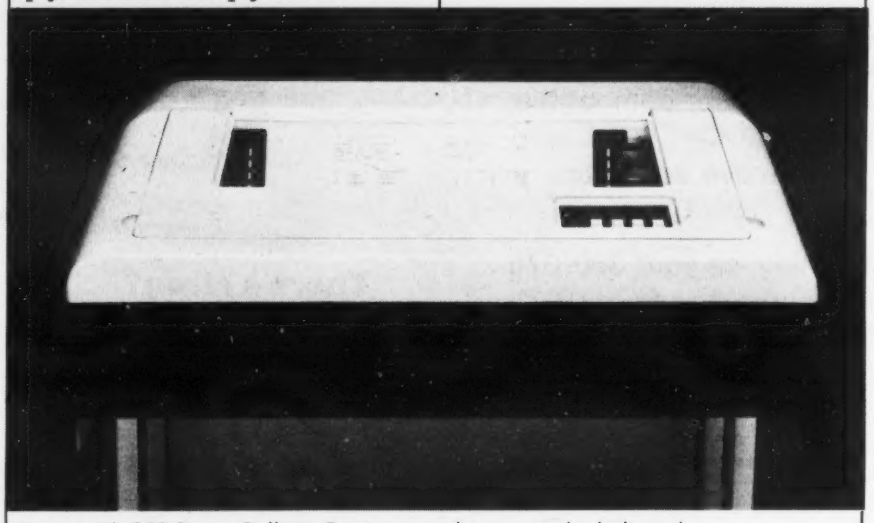
The 300 Series Ballistic Printer is a low-cost, 180 cps printer with a built-in microprocessor that gives you 15 switch-selectable form lengths, 15 perforation skip over formats, and full horizontal and vertical tabulation control. Space and blank character compression. Interface control for serial, parallel, or polling and addressing operations. Plus a non-volatile forms retention system that retains these programmable settings when power to the printer is turned off.

The 300 Series has a character buffer that's optionally expandable to 2048 characters. With the 2048 buffer, the printer can fully buffer a 1920 character CRT screen of data without waiting for the screen to transfer to the printer on a line-by-line basis. And the buffer affords quick dumps of full 1920 character CRT screens.

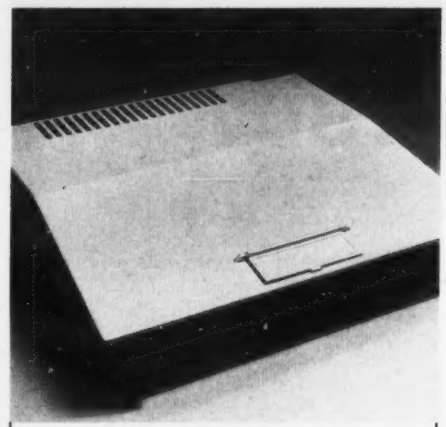
Like all LSI Ballistic Printers, the 300's dependability and negligible duty cycle restrictions originate with its ingeniously simple, patented Ballistic print head. It actually operates without moving cores attached to its print wires. Instead, it uses small armatures that propel its matrix wires in free flight to the platen.

The 300 Series comes with a full 96 ASCII character set, with up to 128 printables optionally expandable to two sets of 128. The printer has, in addition, an elongated character capability, and 10 pitch with 12 and 10/16.5 dual pitch options.

This printer isn't built just simply. It's built simply to last.



Project X's 300 Series Ballistic Printer must be seen to be believed.
PROJECT X PHOTO



Project X's new VDP-410 does just about anything you want it to do.
PROJECT X PHOTO

VDP-410 An Intelligent Building Block

Meet the VDP-410.

It's a low-cost, 16-bit CPU with enough speed and ports to support a variety of peripherals. It provides OEMs with the flexibility to configure a multitude of systems. From communications controllers without external storage capabilities, to sophisticated time-sharing systems with a string of terminals, printers, and disks, the VDP-410 feels right at home in any and all of them.

The 410's DMA channel provides easy expansion. You can even get a cable and an expansion chassis with five slots for 15" cards and a hefty power supply. LSI also offers a disk controller and 10-megabyte disk that complements its entire line of terminals and printers.

The basic system consists of a CPU with 200 nanosecond instruction cycle time, and 16-bit, 32K word memory with a 250 nanosecond access time, and I/O capabilities for communication with three external devices. The CPU, by the way, also includes an expansion port with serial/parallel I/O capabilities.

The VDP-410's instruction set, memory organization, and I/O architecture are compatible with hardware made by Data General and other manufacturers. Operating systems, file management systems, and programming utilities are available from leading software houses as standard packages, so it doesn't take any custom configuring to please the VDP-410.

The VDP-410's instruction set is Nova* compatible, and provides memory access, arithmetic, logical, and I/O functions. It's augmented with load/store-byte, inclusive/exclusive OR, exchange accumulators, multiply/divide, and block mode. And this offers the OEM an incredibly powerful instruction set for tasking and data management.

VDP-1000 A Complete Small Data System

The VDP-1000 actually features many attributes commonly associated with larger systems costing many times more.

Attributes like BASIC, COBOL, and ASGOL programming languages for business and system applications. A virtual memory operating system (VMOS) that lets you develop stand-alone or segmented programs without regard to physical memory size. And up to 40 megabytes of disk storage capacity. You start with a choice of two disk systems and three languages, and configure your system from there.

The basic VDP-1000 consists of a 16-bit CPU, 32K, 16-bit words of dynamic RAM, the world-renowned Dumb Terminal,™ a 180 cps, bi-directional 300 Series Ballistic Printer, and either a 10 megabyte cartridge or 1.25 megabyte floppy disk. All of the electronics, CPU, memory, and disk come in a full-size, wood-grain desk that leaves the surface clear for the console and printer. And there's also convenient work area for the operator.

Once you have the basic system, you add additional storage as you need it. Or want it. Up to four 10 megabyte disk drives or 5 megabytes of floppy capacity. You can upgrade the console with a choice of five smart terminals. And you can add a second or even a third programming language as your needs change or multiply.

The VDP-1000 is exactly the system to meet your needs exactly.

Project X's incredible data system gives you all the features you need, at a price lower than you'd expect.
PROJECT X PHOTO

SEE PROJECT X REVEALED AT THE NCC

June 5th, at Booth 1519.

You won't believe your eyes when you see the staggeringly low prices on Lear Siegler's entire line of products. Prices so low they could only have come from Lear Siegler.

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HEARD ABOUT **BRAEGEN'S TSO?**

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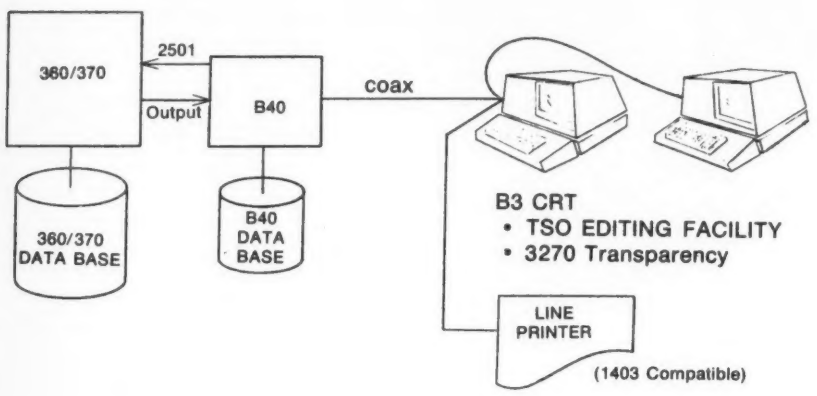
It works with 360 or 370 DOS or OS.

How is this possible?

The Braegen B40 Intelligent Controller attaches directly to your 360/370 channel. No reprogramming is required and no 3270 support software is required. The interface for transferring files between your 360/370 and the B40 is standard 2501 card reader compatible. Your programmers use Braegen's B3 CRT/Keyboard terminals and a full-function *interactive editor* to update programs on the B40 Disk Data Base.

And the B40 does this independently, so your 360/370 is more available. Batch jobs are submitted from CRT's for compile or execution. Meanwhile, other jobs can also be submitted from your other card reader.



Really?

Yes.
The result is you get the benefits of TSO without 360/370 overhead. And the same B40 can also include 2501-compatible card readers, and 1403-compatible line printers, to ease your unit-record load. Locate these (and the terminals) in the programmers' area, up to 7500' from the computer center via coax cable.

There's More?

Yes.
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DOS users can do all this using any model from 360/25 through 370/168. DOS/360 or DOS/VS. You *don't* need a 370x, a megabyte of memory, or *any* software changes! Works great with POWER or other spooling packages.

OS users also get benefits. Since your 360/370 isn't swamped with TSO overhead you get immediate CRT response time.

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(Continued from Page 90)

pan. I doubt it, but the whole situation bespeaks problems facing U.S. industry as it internationalizes within the framework of archaic law.

For example, if we had cause to believe that reducing IBM's market share in Germany would help HIS and Univac expand or other U.S. firms enter, some merit could be found in current Justice Department actions looking into IBM's apparent E series slip in Japan. Now, with Siemens waiting to take over its German marketplace should IBM fall victim to restraint of international trade actions, I seriously doubt the two "second" companies (HIS and Univac have 7% each) would benefit.

Furthermore, a movement to Siemens of IBM engineers — the same ones who have been privy to IBM secrets — may ultimately cause us to bid *auf wiedersehen* to Germany as a major U.S. marketplace.

Acquisition Moves

German industry employs about 50,000 people in *production* of DP products, and the number is growing. Even though one would think that the disparity between the values of the dollar and mark in recent years might encourage the further purchase of foreign-produced products, German plans for converting an already self-sufficient production base from U.S.-ruled to German-ruled status seem overriding.

For the time being, acquisition of U.S. companies seems more consistent with these plans — the recent acquisition of Entrex by Nixdorf and Siemens' partial acquisition and joint venture with Advanced Micro Devices (AMD), for example. In any event, German industry's plans involve the augmentation of current capabilities through further acquisition of foreign firms or joint ventures.

Thus, bringing in Japanese systems directly competitive with IBM's while building its strength abroad, Germany prepares its electronics industry for an *anschluss* vis-a-vis the U.S. manufacturing community. The current drive to implement an earnest training program for developers and users of computer systems technology will increase the probability of victory in our time.

Looming Battle

As some cynics may consider Dr. Amdahl the "Lord High Muck-a-Muck" of the Japanese computer industry, Tom Watson Jr. may be considered Germany's Kris Kringle. With IBM or IBM-like technology swamping the German countryside and IBM's designation of Germany as its No. 2 worldwide marketplace, one can hardly help but conclude that IBM influence there is strong.

Ironically, IBM's designation of Japan as its No. 1 competitive threat means this threat, brought to Germany via the Fujitsu/Siemens/Amdahl trio, will allow Dr. Amdahl to test the

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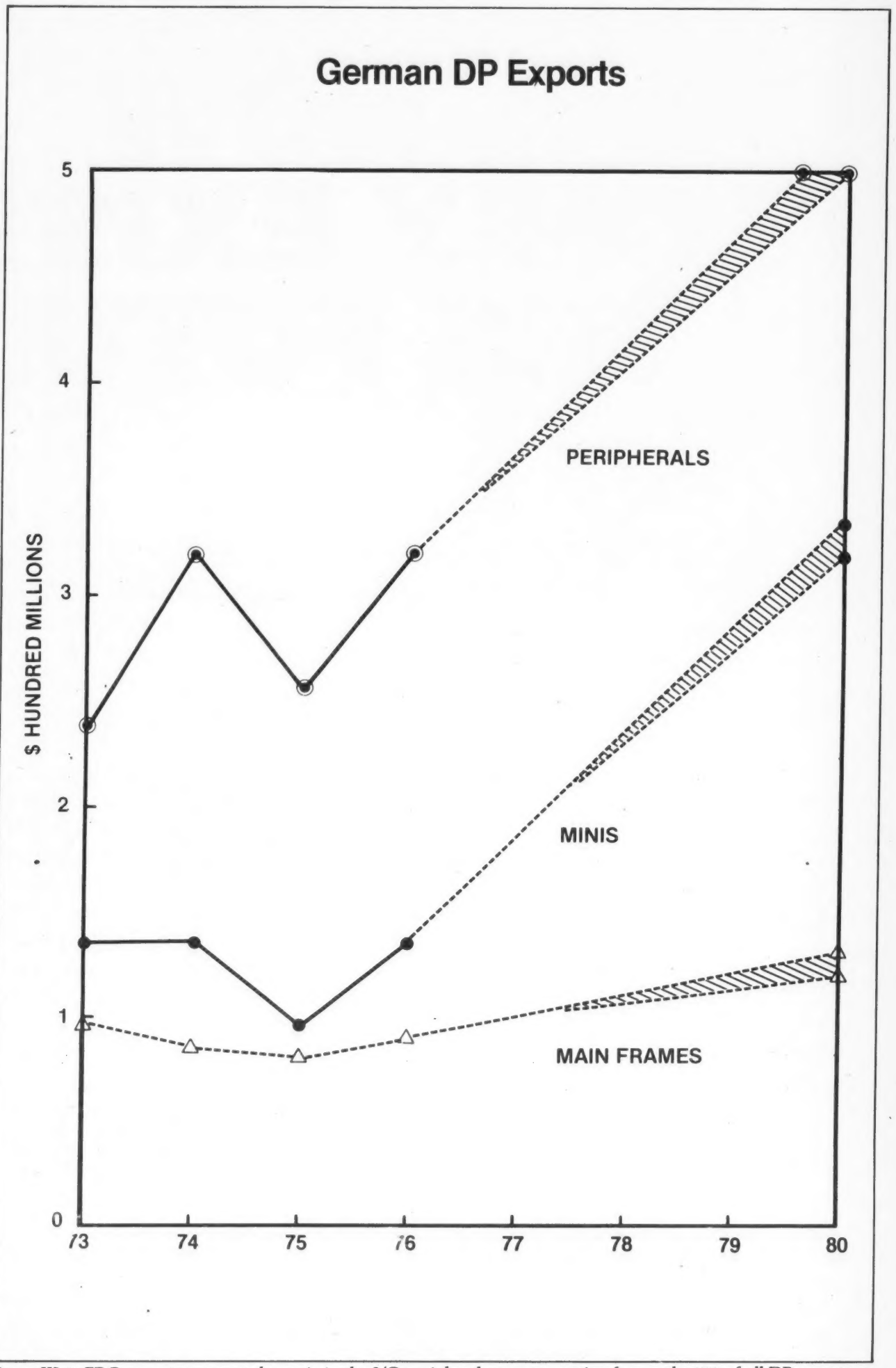

Figure III-5. FRG exports are most dramatic in the I/O peripheral area, accounting for nearly 60% of all DP exports, or $320 million out of $545 million in 1976. Minis should increase to $350 million by the end of the decade, up from $135 million. General-purpose mainframe exports are relatively weak at this time at $90 million, or 16.5% of the total. However, the Siemens/Fujitsu/Amdahl deal is likely to increase this figure well beyond the $130 million projected by 1980.

ITEL'S ADVANCED SYSTEM/6.

UNTIL NOW IT ONLY EXISTED IN THE FUTURE.

A revolution in price/performance alternatives, the Advanced System™ 6 processor complex is Itel's most technologically advanced large-scale computing system. It's not a copy or re-engineering of any other system. In terms of price/performance, the AS/6 outperforms both the IBM 370/168-3 and the newly announced 3032. And utilizing high-speed Large-Scale and Medium-Scale Integration circuitry, the AS/6 is three to four times more powerful than our AS/5.

Like the AS/4 and AS/5, Itel's AS/6 is designed to be a direct replacement for its IBM equivalents and is fully compatible with IBM 360 and 370 software. But our AS/6 has several clear advantages over its IBM counterparts.

For example, the AS/6 Model 7032 Central Processor takes the concept of High Speed Multiplication one step further and gives you High Speed Arithmetic, including High Speed Divide. And the 48K expandable Reloadable Control Storage is a standard feature on this new Advanced System. In addition, the AS/6 is air cooled, so there's no need for the costly, intricate water cooling systems required by comparable IBM CPU's. Dramatic technological advances also permit the AS/6 to be lighter, take up less floor space and consume less power than equivalent systems.

With the new AS/6 and the rest of our Advanced System computer line, Itel offers a broad range of sensible alternatives with substantial price/performance advantages. But then, when it comes to price/performance, Itel has always had a considerable edge. Our AS/4 and AS/5 are alternatives designed for the future. And now we're taking the future a step further.

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ITEL
ADVANCED SYSTEM / 6

IBM HAS A LOCK ON DOS

DFAST IS THE KEY

Five years ago, Tower Systems, Inc. pioneered the concept of a disk management system for DOS users. Today, DFAST is the most extensively used disk management system in the world. And for good reason. DFAST provides more features, offers greater versatility and is supported better than any other similar system. Over 400 DFAST users world-wide can attest to that.

DYNAMIC FILE ALLOCATION . . .
DFAST allocates file space from available area on a disk pack. The user is only required to specify the number of tracks for a file, not the starting relative track number.

*AUTOMATIC SECONDARY EXTENT GENERATION . . .
When a disk output extent has been exhausted the system will automatically generate additional extents with no operator involvement or JCL modification.

*ALLOCATION BY LOGICAL RECORDS . . .
Disk allocation may be requested by number of anticipated logical records. The system will calculate the correct allocation based upon the available DASD device types.

AUTOMATIC VOLUME RECOGNITION (AVR) . . .
The AVR feature of DFAST allows the system to automatically make logical unit assignments by the serial number in the EXTENT card. DFAST will make these assignments if the logical unit is unassigned or assigned to the wrong pack..

PUBLIC SPACE MANAGEMENT . . .
DFAST will allocate area within a user-defined pool of disk drives.

DEVICE INDEPENDENCE . . .
Programs may be run on any DASD device type without re-compiling.

*GENERIC DEVICE INDEPENDENCE . . .
DFAST allows the generic device type to be changed at execute time. Disk files may be changed to tape or vice versa without re-compiling the problem program.

*PRIORITY FILE DISTRIBUTION . . .
User may define the search priority for allocation. Avoids stacking all files on same drive. Provides up to three-fold increase in thruput.

FILE CONCATENATION . . .
DFAST allocates files as close together as possible, thus eliminating unwanted seek time between files on the same pack.

FILE PROTECTION . . .
DFAST allocates area from any available space on the disk, thereby making it unnecessary for operations to delete unexpired files.

*ALLOCATION ON TRACK BOUNDARY . . .
Allocation of files is by track boundary resulting in more efficient DASD utilization.

FILE DELETION . . .
The DFAST system supplies a support program that will expire files by file name. This program may be included in production job streams to delete files when they are no longer needed by the system.

PARTITION INDEPENDENT . . .
DFAST provides a facility for maintaining file uniqueness between partitions. This allows the same file name to be used by more than one partition at the same time on the same disk pack.

TRANSPARENT TO DOS . . .
DFAST requires no modifications to the DOS Supervisor, JCL Language, or user Programs.. DFAST is DOS and DOS/VS RELEASE INDEPENDENT and is compatible with all other software packages.

HARDWARE SOFTWARE COMPATIBILITY . . .
DFAST runs on any model 360 or 370 using the DOS, EDOS, DOS/MVT, or DOS/VS operating system and supports all disk drives (2311, 2314, 3330, and 3340, 3344, 3350, 3330 MoD 11).

NO USER CORE NEEDED . . .
DFAST functions in the transient or SVA area and requires no changes to user programs or partition allocations.

JCL SIMPLIFIED . . .
DFAST does not require explicit fixed addresses for files, thus relieving the necessity of manually mapping the disk.

EASE OF IMPLEMENTATION . . .
DFAST is cataloged in the users core image library and starts working immediately. No changes are required to existing programs or operational procedures.

RELEASE UNUSED FILE SPACE (SD FILES) . . .
When a sequential disk file is closed, only the amount of area used by the program is protected in the VTOC. The unused area is then available for use by other files. This feature allows the user to make more efficient use of his disk resources.

ENQUE/DEQUE OF DATASETS . . .
Files may be protected across partitions at execute time.

*REBLOCK FEATURE . . .
Allows user to modify block size at execution time without re-compiling program.

*PASSWORD PROTECTION . . .
Files may be password-protected to prevent unauthorized access.

*New Feature Version 4

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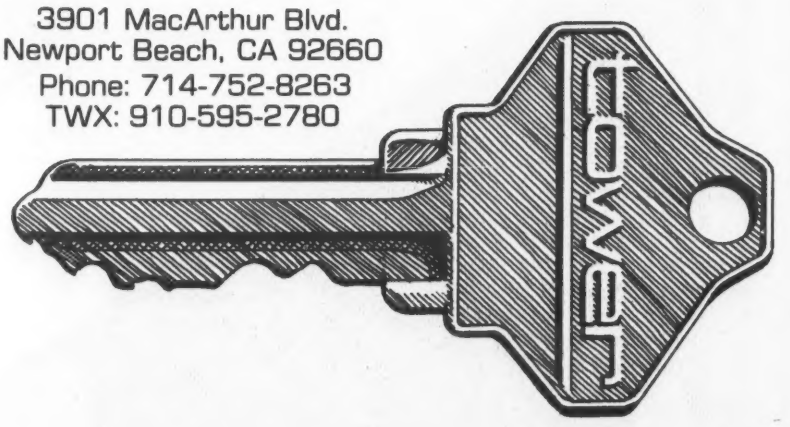

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soundness of his theory of "the case for large systems" once again. How about entrance in the German marketplace of the upgraded Amdahl design (e.g., the Fujitsu M-200 can include up to four processors in multiprocessor configuration, and it uses Fujitsu-developed OS-IV-F4 operating system software) against IBM's 3033 MP for starters?

With this clash looming, and a combined Japanese/German technological front in the EEC in the offing, the consequences to the U.S. computer industry could be serious.

Government R&D Support

The "peripheral" approach we have adopted thus far to our subject of "Germany today" — through the hot topic of the Siemens/Fujitsu/Amdahl plan and a comparison of the stimuli for the sudden rise of the Japanese-owned and the sluggish rise of a German-owned computer system industry — has been intentional.

Up until the past few years, Germany's skills were chiefly being poured into foreign (mostly U.S.) computer systems. The Germany of today is a far cry from that of even five years ago in terms of the number of success stories that can be told about domestic manufacturers' improvement of German-owned technological self-sufficiency and the effective launching of government-supported plans to improve the entire DP situation.

The German government plans to provide about 459 million deutsche marks (DM), or $230 million, for R&D projects in its DP industry during the four years from 1975 to 1979. In contrast, its R&D funding during the 1967-1974 period (seven years) amounted to nearly 800 million DM ($400 million at current rates of exchange).

A breakdown of company R&D support funds follows:

%		1975-79
62	Siemens	286 million DM
12	AEG-Telefunken	55 million DM
9	Konstanz[7]	41 million DM
14	Nixdorf	62 million DM
3	Kienzle	15 million DM
100		459 million DM

Note that the largest companies received the lion's share, i.e., Siemens with about 71% of all R&D. These funds, together with matching company expenditures, will at Siemens be spent primarily on:

- The "Y-line" new computer generation.
- Components (microprocessors, memories, charge-coupled devices, etc.)[8].
- Fiber-optic transmission links.
- "Viewdata" (future audio/video device with keyboard).
- Electronic mail technology.

Indeed, it is hard to imagine more capable contenders for control of IBM's German marketplace than a Siemens further strengthened at the high end of its product line and a Nixdorf and Kienzle already strong at the low end with small business systems and minis, especially as IBM's grip on that market weakens. And with Siemens already building almost plug-compatible IBM equipment, Fujitsu essentially doing the same and IBM building IBM equipment, the mind boggles at the stream of IBM or IBM-like technology Germans, or for that matter the EEC and possibly Soviet bloc countries (Soviet Riad and IBM 360 and 370 technology are very close cousins) will be using in the 1980s.

It might be argued this phenomenon could be of some benefit to noteworthy manufacturers of non-IBM-compatible equipment, like Univac and HIS. Such arguments may all turn out to be futile games in logic based on hopeful scenarios that assume, for example, price wars causing reductions in quality of support which may make other manufactuers' products more attractive.

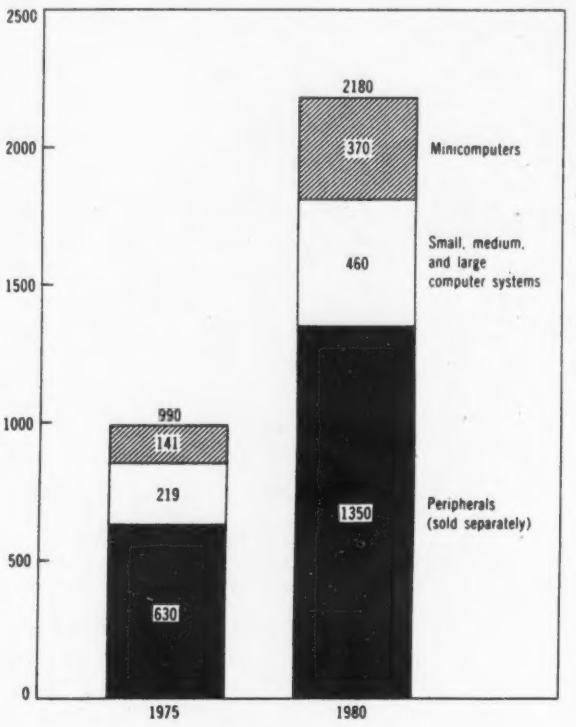
With the U.S. government bent on breaking up IBM, the German government, for its part, seems bent upon bringing it to Germany already broken up. However that may be, little value can be argued for a weakened HIS, Univac, Burroughs, CDC, NCR Corp. and Digital Equipment Corp. By and large, all their systems are of radically different architectures, the data structures and software mostly incompatible in critical ways, and their continuation highly dependent upon the product choices these companies represent to critical, analytical and intelligent, if not highly sophisticated, users.

HIS, among the few successful producers of general-purpose computing equipment in the world, now holds 7% of the German marketplace, as does Univac, also among the finest and the few successful large U.S. computer systems companies.

It is hard to see how either of these two companies, themselves battered by international crosscurrents, could be benefited by a Siemens/Fujitsu/Amdahl venture. Since all other manufacturers taken together (that is, all other but IBM, Siemens, HIS and Univac) constitute roughly 8% of the German marketplace — most of which involves small system sales — the introduction of new, powerful, IBM-like systems in Germany will hit HIS and Univac where it really hurts: in their products line, mainly at the upper end. That their processors can easily be argued to be better suited to certain kinds of applications is without a doubt true. I fear that German users eyeballing the future may regard such factors as the availability of trained staff as overriding in the selection of processor technology. Thus, however advanced or available HIS and Univac technology may be, its future cannot help but be adversely affected by the entrance of Fujitsu et al, if current trends continue.

Loss of Alternatives

Analyzing Figure III-5, we notice that my concern for the possible exit of U.S. and other manufacturers may also very well be shared by the German government. The remaining firms producing general-purpose, small to large-scale systems constitute only 8% of the German market and are mostly foreign (U.S.). These include noteworthy firms such as CDC, NCR, ICL, DEC, Burroughs and several others.



Source: Bureau of International Commerce, Office of International Marketing research report, The Market for Computers and Peripheral Equipment in Germany

Figure III-6. Shown is the German market in 1975 and 1980 for computers and peripheral equipment in millions of U.S. dollars.

Whatever the adverse affect of a strengthened Siemens on HIS or Univac, we can be sure that its impact will be larger on the other U.S. firms involved. If the Siemens/Fujitsu/Amdahl product lines are successful, the German govenrment just may lose the many alternatives it currently has. Indeed, HIS, Univac and DEC may be the only three U.S. firms with enough staying power to survive.

Increasing costs of labor and fear of technological obsolescence may make experience with IBM or IBM-like systems a must for German user professionals. The further introduction of these processors will admittedly benefit German users over the near term in that it will provide them with systems acquisition alternatives which are almost compatible to and competitive with IBM products.

Should the Siemens/Fujitsu/Amdahl plan *not* work out, or not work out well enough or fast enough, IBM may become as essential to the German government as sauerkraut is to knockwurst.

Further to this point, IBM is not unaware of the ride plug-compatible companies take on its years of investment in software and hardware architecture, and it is no doubt planning countermeasures to make life a bit more difficult for them. Rapid-fire product introductions, price cutting, variations of hardware/software/firmware mixes and unbundling of heretofore-bundled system control software (with high prices) could have a severely negative impact on Siemens' plans before they get into full swing.

And with distributed and networked minis increasingly the vogue, IBM may decide to make its competitive stand in Germany against the latter's small systems manufacturers, hoping that, by going this route, it can introduce a newly seeded, incompatible line of machines (although conversion bridges would be provided) that will compel Siemens to support yet other product line migration paths.

Siemens' plans call for the use of its own software to support its new Fujitsu systems, as well as Fujitsu's OS-IV-F4 (equivalent to IBM's MVS), a heroic task at best — MVS today has well over five million lines of code.

With Amdahl running IBM-leased software, Fujitsu running a modified version and Siemens its own, keeping various versions untangled for users as they choose the lower priced Siemens alternatives won't be easy. While the

(Continued from Page 101)

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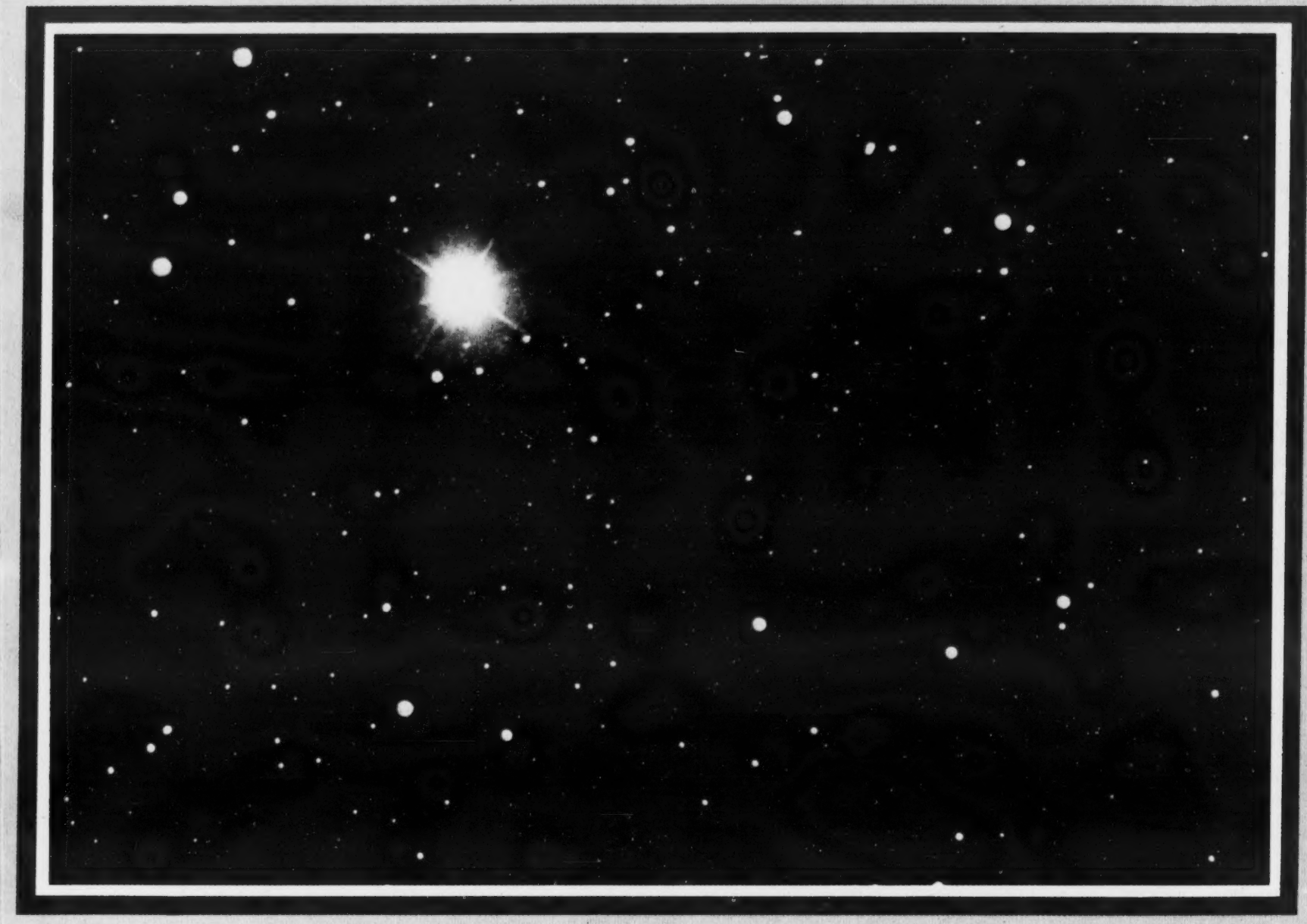

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(Continued from Page 99)

Siemens/Fujitsu/Amdahl venture therefore poses the same threat it does to IBM and the other major U.S. manufacturers, its success is no foregone conclusion.

Given IBM's long history of total success and the untested nature of the Siemens/Fujitsu/Amdahl relationship, conflict between the two should by all rights result in a decisive victory for IBM, with the other manufacturers out of the picture and only IBM surviving. However far-fetched this scenario may be, its run-through here dramatizes the dilemma facing the German computer industry as it plans its future.

Warning to U.S.

There is little doubt the U.S.' *entire* economy will be adversely affected if we manage to lose the decisive position of strength and leadership we now hold in computer technology. That our security will also be compromised, as we enter into an era wherein technical sophistication will constitute one of the key factors in a successful national defense, is particularly sad.

Further amplification of these points exist in Chapter II. The message in that part of *Tsunami* was that the U.S. government had better recast its thinking about its computer (and communications) industry, stop dissipating its energies in nonproductive combat with it and take the lead in the creation of a national policy to ensure its health.

For it is my opinion that Germany's computer industry, while late in developing, is growing increasingly strong. And the recent announcement of the Siemens/Fujitsu/Amdahl plan provides us with further reminders that our industries are not as invulnerable as we once thought.

Severe competition from well-engineered products produced by German-owned electronics manufacturers within Germany appears inevitable. Moreover, the introduction of Fujitsu's most advanced large-processor technology to the European continent through as able a partnership as that binding Siemens and the German government suggests it might not be amiss for us to reflect on the implications of such a combination for our national security.

It seems clear that man's record in controlling his aggressiveness compares unfavorably with his achievement in providing the technological means to give it expression. That there is a rather regular pattern of aggressive behavior running through man's conduct of both internal and international affairs certainly cannot have escaped the notice of even the most noncritical of minds.

If we can agree that conspiracy plays a far less prominent role in the eruption of conflict than does a pervasive tendency to ineptitude then our need for national defense takes on a variety of new and different meanings and increased urgency. The common enemy, against whom all national defense is directed, may well be mankind's proven clumsiness in resolving conflict without tragedy.

The implications of this are immense. Included among them are:

• That national defense must encompass preparation for survival in a world where the drawing of distinctions between our enemies and ourselves as foes may be unwarranted, or at least not germane.

• That mankind's record thus far leaves little hope that individuals or nations can live without defense against the forces of ineptitude in the foreseeable future.

The "War to End All Wars" was followed by a larger world war, to which it was clearly impossible to attach so hopeful or glorious an epithet. Since then there has been almost constant incendiary conflict and strife. This suggests to anyone concerned with the issue that there is at best just too much gunpowder around and too many devices designed to facilitate its use.

It is not necessary to be a visiting extraterrestrial to be saddened by the absurd "all or nothing" modalities in

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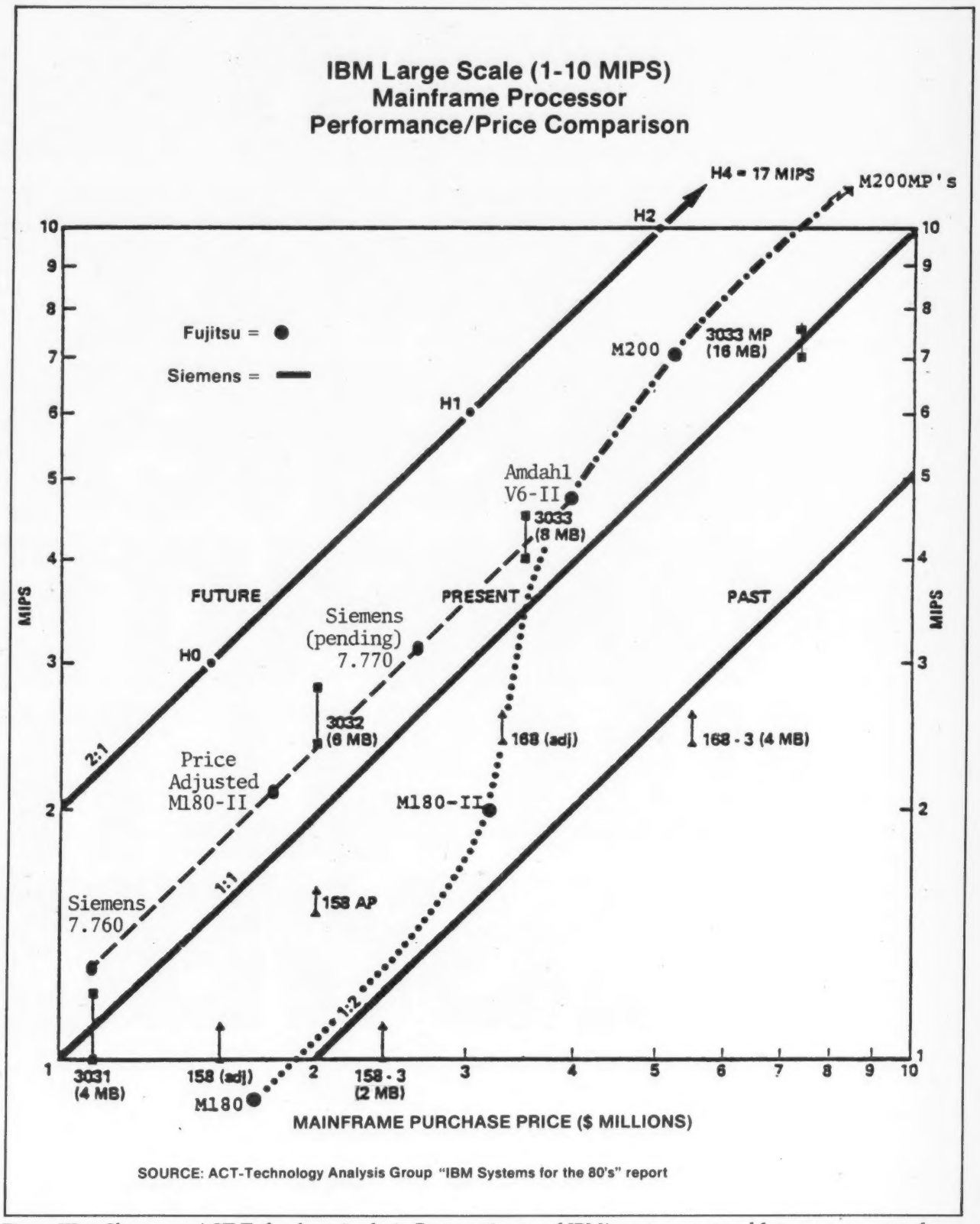

Figure III-7. Shown are ACT Technology Analysis Group estimates of IBM's past, present and future processor performance and prices vis-a-vis the Siemens 7.760 and pending 7.770, Fujitsu M180-II (with assumed price adjustment to be competitive), the Amdahl 470V/6-II and Fujitsu M-200. The Fujitsu/Amdahl connection would provide a migration growth path for the Siemens Model 7.760, thus enhancing its marketability, while giving the German company a more competitive posture both below (M180-II) and above (Siemens forthcoming Model 7.770) the IBM 3032. In addition, the Amdahl V/6-II would strengthen its position against the IBM 3033, while the Fujitsu M-200 would solidify its ultra large-scale image vs. IBM's 3033MP.

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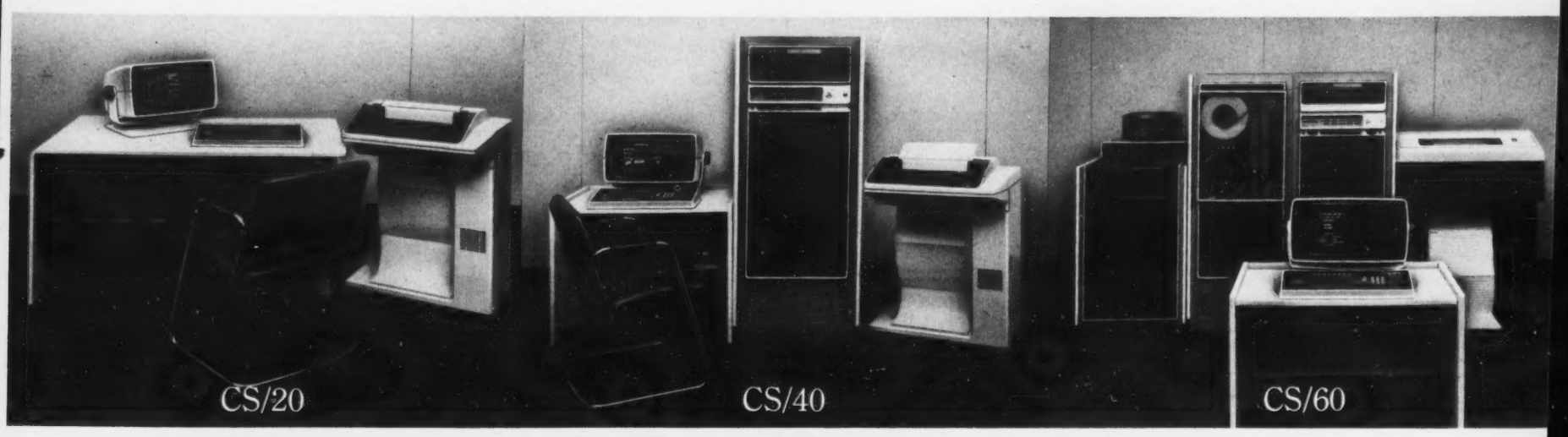

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IN DEPTH

(Continued from Page 101)

which earthlings habitually cast their response to perceived conflicts of interest.

If we wish to take meaningful strides in the elimination of "all or nothing" combat situations, we must stop playing around with *primarily* "all or nothing" alternatives as characterized by current nuclear-based thinking. Electronic technology opens vast vistas in preemptive or retaliatory actions, vistas which do not lead to overkill or unnecessary physical trauma.

Also, arguments that are intended to allay fears of accidental madness grow weaker as the nuclear club grows, especially if we fear ineptitude to be mankind's greatest enemy. A highly developed computer (and communications) technology could provide the community of nations of goodwill with a nervous system to detect growing difficulties, as well as the means to defuse them before explosive measures become necessary.

Arguing the case to establish proper guidelines to control the use of electronic technology, say in the privacy area, is a far preferable occupation to that of figuring out how to prevent an invasion of privacy by a nuclear blast.

Some measure of consolation is offered by the fact that Japan, No. 2 in the line-up of home-owned computer systems manufacturers, and Germany, soon to race France and England for the most all-encompassing degree of self-sufficiency in Europe, are the prime examples of countries fostering a computer industry which lowers the potential of our own in international trade. After all, both are convincing in their expressions of friendship toward the U.S.

But we would be unwise to assume friendship forever from anyone, however fervently we may hope for it. And even if it were so with our friends, other nations ranging from those allied with our ideas, through the so-called neutrals, to avowed belligerents are growing increasingly capable of nurturing and supporting their own competitive techologies.

Our electronics-based defensive weapon or surveillance alternatives stand to be reduced through the reduction in effectiveness of our computer industry in world commerce. Thus far, our computer industry has been heroic in stemming the flow of U.S.dollars abroad,[9] investing some of these dollars in new technology which flows back into all sectors of endeavor (including the military sector).

It is my opinion that a strong computer/communications-based technology will be needed in the U.S. for the conceivable future to provide its defense establishment with the tools we acknowledge it needs to protect us while we await a global reconciliation.

Needless to say, we cannot reasonably hope — nor should we — to inhibit the progress being made abroad through any other means than our own ingenuity in staying ahead. If we are to maintain our current lead, our government will have to clue us in on its long-range plans for fostering and protecting our computer industry's viability, even while it tests its leader with legal action for having the effrontery to be ahead.

The rumored discussions between Japan's NEC and France's Compagnie Internationale Pour L'Informatique — Honeywell Bull (CII-HB) suggest further Western European competition from Japanese firms as well as a French answer to Siemen's new plan (stated by a CII-HB financial director in a recent *Datamation* article). The Soviet Union and China both stand to benefit by our diminished influence in Western Europe in an area so vital to our defense.

Lecht is the author of five previous books on computer-related matters; The Programmer's Fortran II and IV, The Programmer's Algol, The Programer's PL/I *and* The Management of Computer Programming Projects *and most recently,* The Waves of Change.

He is president of Advanced Computer Techniques Corp., which he founded in 1962, and has lectured widely for such groups as the Association for Computing Machinery, American Management Association, American Society for Information Science and Data Processing Management Association.

NOTES

[1]The communique was in the form of a translation of an article that appeared recently in the Japanese press; it is reprinted here as edited by the Technology Analysis Group staff.

[2]European Economic Community, or Common Market.

[3]The Fujitsu M180-II is approximately a 2-Mips (millions of instructions per second) machine, compared with the IBM 3032 at about 2.5 to 2.7 Mips.The M180-II is also higher priced, and some downward adjustment is therefore anticipated. The M-200 is a 7- to 8-Mips processor, like IBM's 3033MP, and is competitively priced.

[4]Herbert E. Mayer, "Those Worrisome Technology Experts," *Fortune*, May 22, 1978.

[5]Small business systems, minis and distributed processors are more popular than "big" systems in the FRG today.

[6]See *Waves of Change* by Charles P. Lecht, ACT, 1978.

[7]Now a Siemens subsidiary.

[8]The German government is expected to increase its R&D budget for integrated circuit components in 1978, perhaps stimulated by the significant attention and yen investment committed by the Japanese government to this vital area.

[9]See the *Fortune* article cited earlier.

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Multi-Terminal Link	YES	NO	Time Slice Control	YES	YES
Multi-Terminal P.I.P.	YES	NO	Ext. Terminal Capability.	YES	NO
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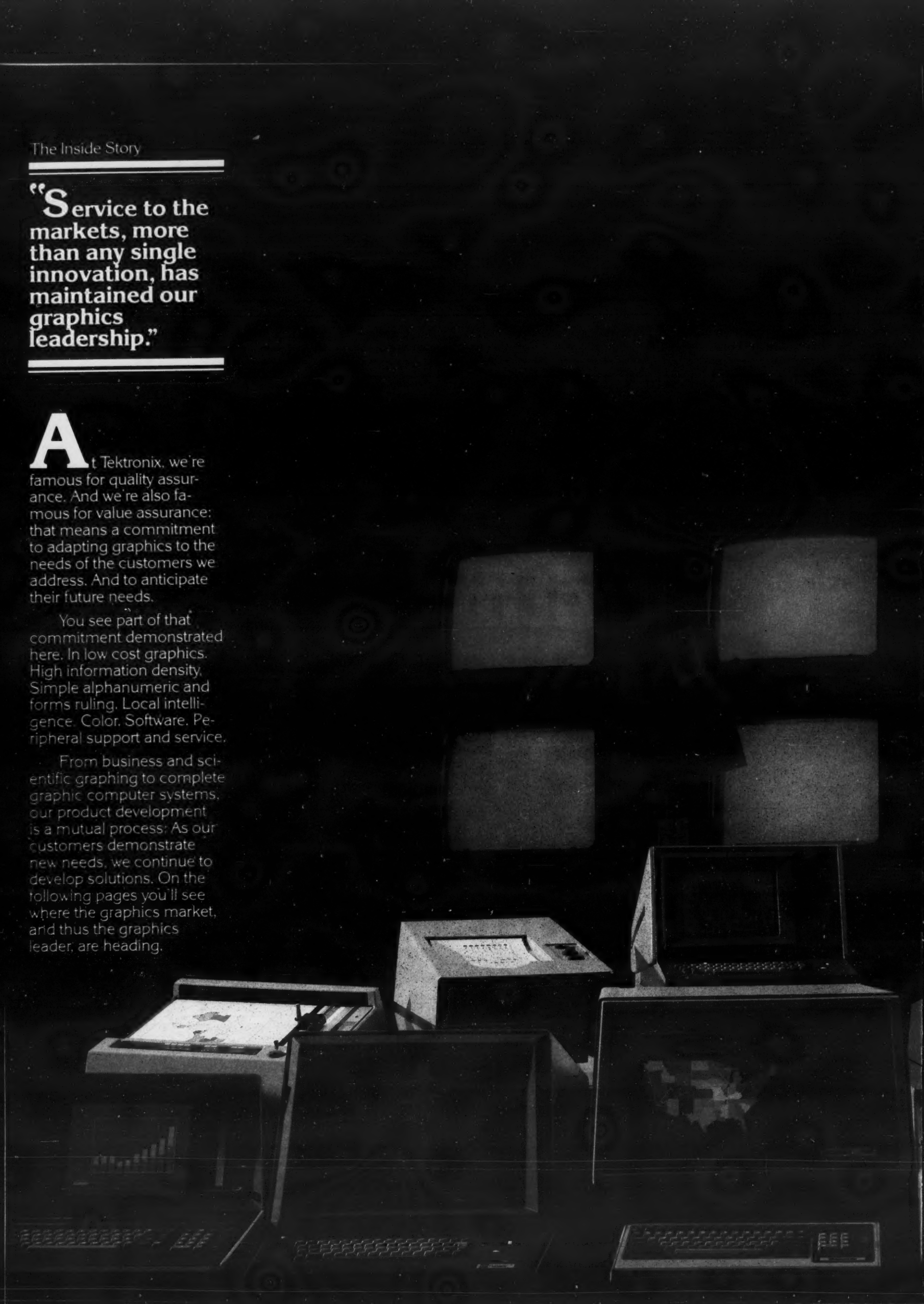

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"Many of our customers are ready for color. Now for the first time, color is ready for them."

Tektronix has long been a leader in refresh capability. Our first, highly-rated alphanumeric terminal was a pioneer in forms-ruling.

Now we have increased this capability to meet new needs. Our recent additions have brought new levels of both graphics simplicity and sophistication into the marketplace.

The 4020 Series offers general business environments an easy evolution to graphics.

Expandable from simple alphanumerics to graphics, this new series makes graphing capability as easy as alphanumeric output has been for years. Yet it's versatile. Rather than fix a few graphing formats in firmware, we designed a complementary English-language, PLOT 10 Easy Graphing software package. Now many non-graphic information systems can easily add graphics capability.

Even more significant may be the introduction of our new color terminal, the 4027.

It literally sets the standard for color graphics — from the one company with the expertise, the service and reputation to give real value to color capability.

Tektronix color will add a new dimension, clarity and convenience to many applications. Sometimes a simple change of color can communicate even more quickly than a graph.

This represents the first effort to bring universal order to color graphics.

When we brought out our first storage tube terminal and supporting software years ago, we developed standards and coding systems that are still in use today. The same will be true for color.

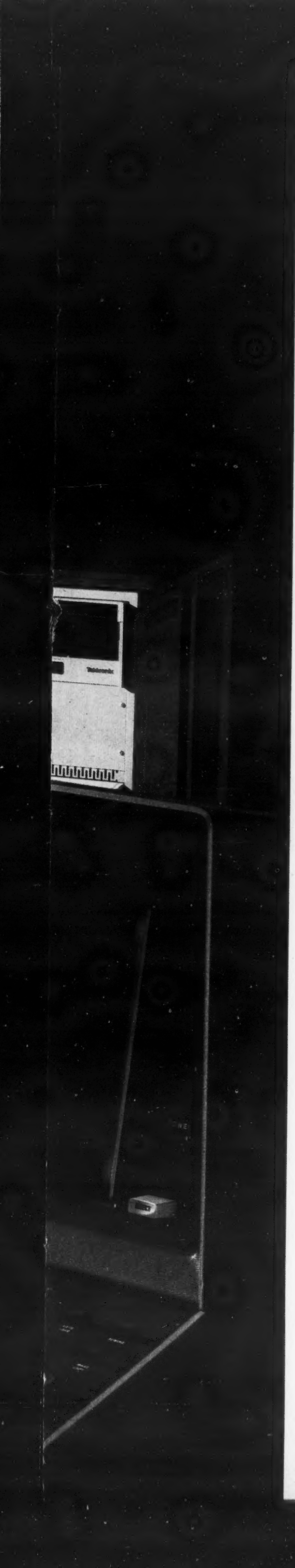
We've also made sure that our current customers can make an easy transition from present graphics to color: with compatible software. Multi-color plotter support. Gray-scale hard copy. . .and continued innovation as our customers' color requirements advance.

Tektronix color is designed to facilitate graphical interpretation of statistics in business graphing, and to answer the needs of computer-assisted instruction, laboratory analysis, mapping and network modeling.

Until now, these applications could only imagine the possibility of color graphics. We're making it practical.

Refresh
ESC
TAB
CTRL
SHIFT
RETURN

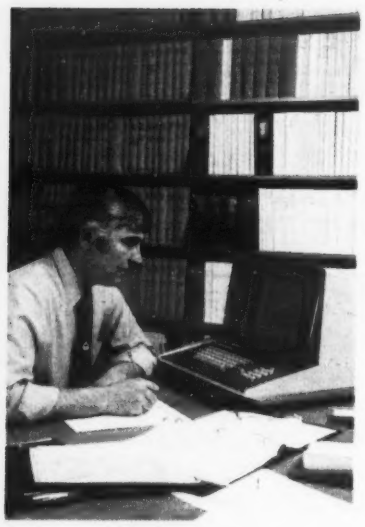
Intelligence



"Easy-to-use stand alone systems can free our customers to do what they do best."

We plan our intelligent products to expand upon many of the same time, cost, and labor saving benefits of graphics: by reducing routine processes, intelligence can keep each customer working at the decision-making level.

Our goal is to make each product as simple and personally manageable as possible. By understanding our customers and answering their applications one by one, we make our intelligent graphics products an extension of the mind.



Personal computing is already improving decision-making information—not only in engineering and scientific environments, but on the desktops of corporate management.

The smartest thing about our personal computer is how well it works with its operator.

The desktop computer user expects an immediate comfort level. He looks for simplicity. An easy-to-use language. A familiar keyboard. And fast answers. So when we built our 4051 graphics system, we made it powerful enough to command a system of peripherals and to operate as an intelligent terminal. But we also designed it to be inherently simple to operate and easy to understand.

It is so consistent that once you've mastered it you don't have to live with a set of manuals.

While designing a non-restrictive hardware package responsive to the expectations of most personal computer users, we've individualized software to specific users groups. Including utilities for sophisticated programmers. Easy application packages like Modeling & Reporting. A PLOT 50 library that includes statistics, mathematics and electrical engineering. Plus a business planning package that produces bar charts, pie charts and line graphs with little more input than the numbers themselves.

Customer needs are leading graphics intelligence into new territories.

Recognizing some major bottlenecks in the nearly universal engineering technique of finite element analysis, we designed the FEM181, a complete stand-alone applications package that can cut the long, arduous task of finite element modeling by up to two-thirds the time and cost.

You can be sure, too, that with Tektronix' customer orientation these future developments will be done not only with intelligence but with good common sense based on your future needs.

"We saw the need to distribute information. Which is why we now lead the art of putting graphics on paper."

To the computer builder, graphics is just one more peripheral to his central system. But at Tektronix, we regard all our products as peripheral to the central idea of quality graphics solving customer needs.

...That's why peripherals like our plotters and hard copy are graphics leaders in their own right.

Take plotters. In 1976 we introduced the first smart B-size (11"x17") unit, and led the trend away from analog to digital devices, with the 4662. Its customer base ranges from advanced research environments to office timesharing systems.

Tektronix digital plotters provide intelligence, precision and multi-color graphics to many applications needing permanent or camera-ready plots.

The C-size plotter: Not just bigger. More versatile.

Now we are introducing a C-size (17"x22") plotter, the 4663. The thinking behind it, and inside it, is as advanced as it looks.

Although C-size plotters are now rare in printed circuit design, numeric control, civil engineering and drafting environments, much of their work can be done on a C-size work station...cutting time and costs significantly.

Many of our customers have already begun redefining their needs to fit the benefits of the C-size plotter alternative.

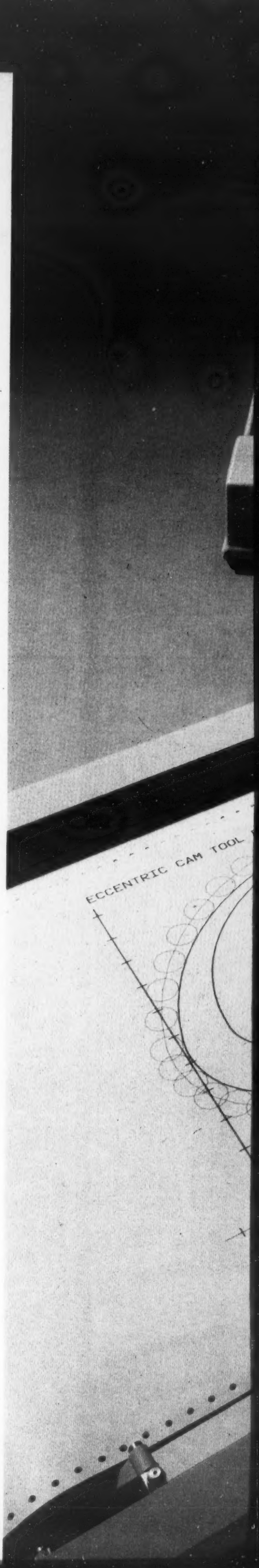
Its local intelligence distributes the graphic workload, and configures easily with existing Tektronix products.

It offers increased character generation capability. Circular interpolation. Automatic paper advance. All in a flexible, easy-to-use package.

In display hard copy, too, we've achieved a quality and simplicity any user would appreciate.

Hard copy from the push of a button: It's a simple operation that hides the advanced technology behind high quality copy. It provides sharp, dry copies directly from the screen in a matter of seconds, with reliability that lives up to Tektronix standards.

Our customers take for granted the fact that hard copy is now personal, quick, and economical. The more people can take us for granted, the better we're doing our job.



Plotter. Hard Copy.

OEM

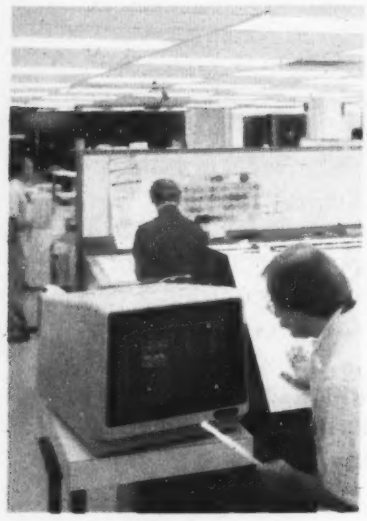
"We sell the same thing to every system builder: a reliable and responsive partnership."

A few years ago, Tektronix committed itself to a separate organization specifically to serve the OEM needs of the system builder.

It was really the only way. Compared to other markets, many OEM needs are as different as night and day.

Or as different as today and tomorrow. Because what the system builder looks for, more than product reliability, are far-sighted technologies and long-term, close working relationships with their manufacturers.

Our responsibility to the system builder begins with an introduction to our graphics' concept and potential. It involves helping define needs and prove systems feasibility—often years in advance of actual OEM product purchase.



System builders for the publishing market are looking to Tektronix graphics for new capabilities in graphic editing. New dimension in page layout.

The GMA display series: our first graphics designed specifically for the systems builder.

Planning often includes our GMA modules: combining refresh and storage capability within the same tube, they bring our customers the high detail and economy of storage display, plus the dynamics of refresh. They are designed around a modular chassis that enables easy threading of system cables and addition of a wide range of optional components.

This modular approach helps many system builders cut costs by ordering custom configurations virtually "off the shelf." At the same time, our engineers and manufacturing people are on-call to further tailor the product to meet individual needs.

Inherent to our OEM concept is upward-expandability. System builders who switch to our new 25-inch display, for example, will be able to do so with no modification to software, timing, or interfaces.

In the OEM market, corporate strength is also a product feature.

Vendor "staying power" is especially important to the OEM. We appeal to people who seek not simply a product, but an extension of their own manufacturing lines.

You'll find too, that we value our OEM customers for many of the same reasons they value us. The benefits are truly reciprocal: it is through other innovators exercising our product concepts that we learn the full potential of our own technologies…and, in the long run, learn to make graphics better and better for the end user. That's what good partnerships are all about.

"We designed PLOT 10 IGL to anticipate the needs and new equipment that come with growing markets."

One of the biggest pitfalls in computation has been around since William Burroughs invented the adding machine 80 years ago. Burroughs had 50 of his first model built before realizing that no customer was ever likely to get the hang of its operation. Hardware builders have been falling into the same pit ever since.

At Tektronix, we make our products' operation as easy as possible, and provide the tools for future expansion. That includes operational software and documentation that is the most thorough in the industry.

PLOT 10 Software has set a standard for the industry to follow.

Our PLOT 10 Terminal Control System was the industry's first major effort at packaging the building blocks of graphics programming. Today, virtually all other graphics suppliers have made their equipment PLOT 10-compatible.

That's a leadership role we plan to maintain, by continuing to support our customers' specific software needs. Towards this end, our latest software package may be the most versatile ever.

Known as the PLOT 10 Interactive Graphics Library, this latest package is completely I/O and device-independent. It allows a customer to run programs today, for example, on a color graphics terminal, then on a storage terminal tomorrow. He can also update his graphics to new applications by selecting advanced capabilities, like 3-D and line smoothing, one at a time.

Our PLOT 50 library, designed for our personal computer, includes the most comprehensive series of statistics volumes yet developed, plus other powerful applications software. Plot 80, developed for the 4081 Interactive Graphics Terminal, includes wide-ranging operational and graphics software, host-resident support subroutines, utilities and diagnostics.

The power and convenience of these software packages don't accrue only to the sophisticated programmer, but to users of all experience levels as well. Although the sophisticated innovator is usually our first customer, we're concerned with looking ahead to those users who will be starting with graphics tomorrow.

For more from the graphics leader, come see us at NCC.

The new PLOT 10 Interactive Graphics Library is built for expanding customer capabilities. It supports color, peripherals, and advanced graphic capabilities in a highly modular, device-independent package.

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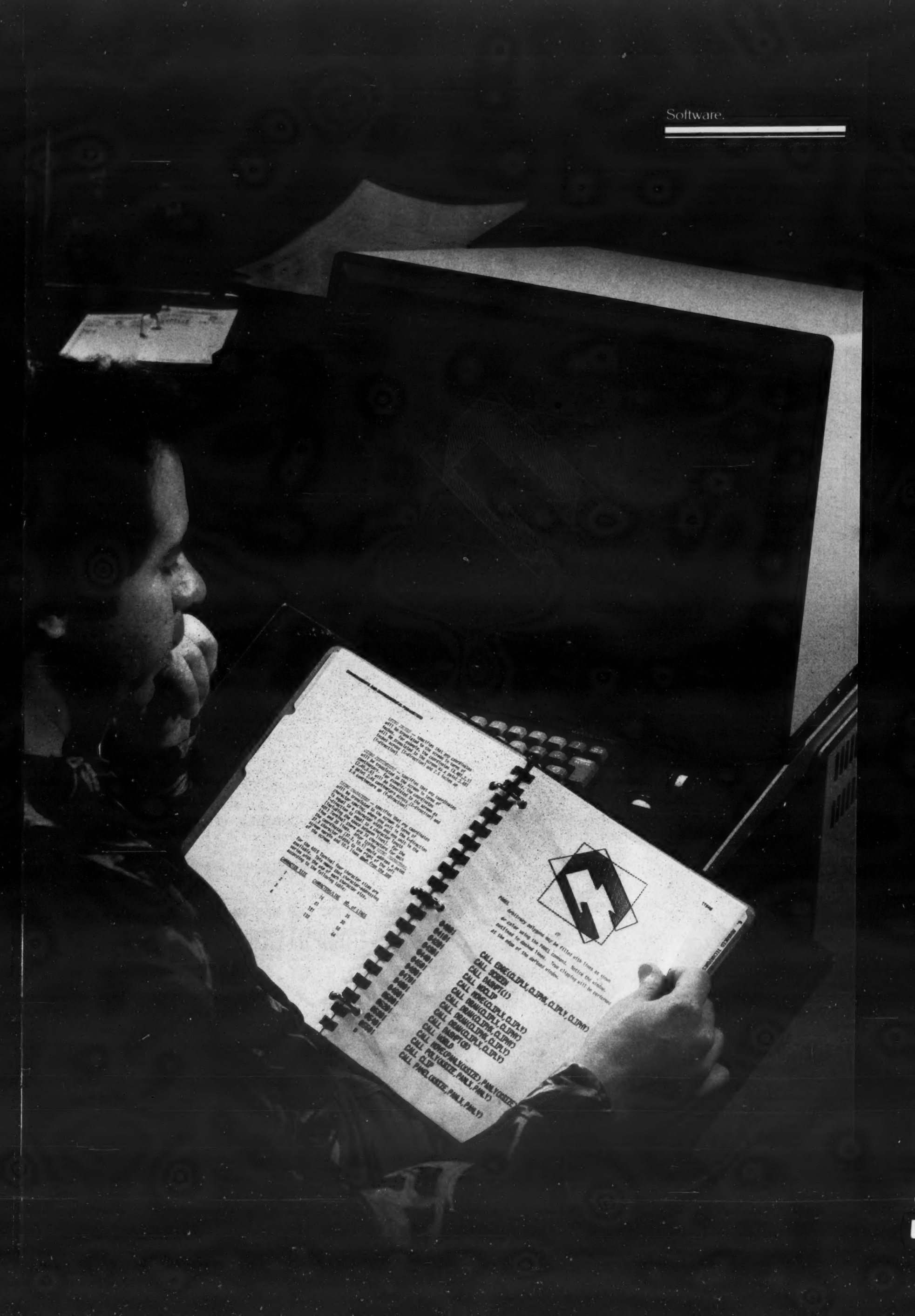

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IN DEPTH

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Data Base Systems: Design, Implementation And Management, Part III

IN DEPTH

By Ronald G. Ross

The information contained in the following system descriptions was obtained directly from the data base management system (DBMS) vendors. Every effort was made to ensure accuracy.

The system descriptions have been ordered in the manner indicated in Figure 1.

* * *

INFORMATION MANAGEMENT SYSTEM (IMS)

IBM's IMS is a widely implemented data base management system, rivaled in numbers only by Cincom Systems, Inc.'s Total. It ws originally designed in the mid-1960s in conjunction with the Apollo space program.

IMS is actually a generic name for a family of systems, encompassing various levels of compatibility with other IBM systems. Basic data handling under IMS is performed by Data Language 1 (DL/1) and is typically meant to include a telecommunications feature. DL/1 is a data base system in its own right, suitable for batch operations.

The most important current configurations of IMS are the following: IMS/VS under the OS/VS1, SVS or MVS operating systems; IMS-2 (IMS/360) under OS/MFT or OS/MVT; and DL/1 under DOS/VS. The most advanced features are found in IMS/VS, which was first released in February 1974.

IMS offers an integrated data communications feature, IMS/DC, which is priced separately. Interfacing with the Customer Information Control System (CICS) is supported as an alternative to IMS/DC.

An application program interfaces with the IMS data base via a CALL statement, using appropriate arguments. Host languages include Cobol, PL/I and Assembler. Under IMS/DC, a query facility, IQF, is supported.

The data description and manipulation languages of IMS are foreign to Codasyl specifications.

Highly attractive IMS/VS features include:

System	Vendor	Est. Number of Users*
DBMS Offered by Mainframe Computer Vendors		
IMS	IBM Corporation	600–900
I-D-S/II	Honeywell Information Systems, Inc. (H.I.S.)	425 for I-D-S/I
DMS 1100	Sperry UNIVAC	250
DMS/90	Sperry UNIVAC	40
DBMS-10	Digital Equipment Corp. (DEC)	75
DMS-II	Burroughs Corp.	100
DMS-170	Control Data Corp. (CDC)	(new)
Independent DBMS for Mainframe Systems		
TOTAL	Cincom Systems, Inc.	1,100
IDMS	Cullinane Corp.	200
ADABAS	Software AG	200
SYSTEM 2000	MRI Systems Corp.	200
DATACOM/DB	Insyte Corp. (formerly C.I.M. Corp.)	75
INQUIRE	Infodata Systems, Inc.	75
Model 204	Computer Corporation of America (C.C.A.)	30
DBMS Offered for Mini-Computer Systems		
IMAGE/3000	Hewlett-Packard Corp.	200
Varian TOTAL	Sperry UNIVAC (formerly Varian Data Machines)	50
DBMS-11	Digital Equipment Corp. (DEC)	50
Prime DBMS	Prime Computer, Inc.	(new)
INFOS	Data General Corp. (DG)	†
ADMINS/11	ADMINS, Inc.	†
Representative Systems from the Remote-Computing Industry		
MAGNUM	Tymshare, Inc.	225
NOMAD	National CSS, Inc.	275

* As of January 1978.
†Number of users unavailable.

Figure 1: Data base management systems by vendors and numbers of users.

- A program isolation feature, which prevents concurrent update by multiple programs scheduled against the same data base.
- The ability to handle batch and online processes simultaneously.
- Various security features for monitoring and controlling data access.

Data structuring under IMS is hierarchical (represented schematically by tree structures), with data elements grouped into segments. Access paths, called logical relationships, may be established between physical tree structures, giving a networklike data configuration.

A number of choices in internal pointer types and storage patterns are available; entry point access to data base roots is sequential, randomized or indexed.

The use of Vsam as an internal access method allows support for secondary indexes and variable-length segments; these features help establish IMS' position among a small group of DBMS defining the state of the art in data-structuring capability. However, IMS does not support data independence to the level of individual data items; all access is to records (that is, segments) as they physically reside in the data base.

Search arguments called SSAs are supported for selective segment access; user access to IMS data bases is both controlled and enhanced by a device similar in concept to a subschema, known in IMS as a PSB.

IMS is an extremely powerful data-handling system, but the overhead costs are held to be high. A great deal of administrative support is necessary on a continuing basis, so the system itself tends to consume professional resources.

Some users find the calling conventions cumbersome and difficult to learn. Overall, education and training for effective use of IMS is relatively expensive.

IBM has attempted to make IMS a comprehensive data management facility, but it is not as complete as those of several other vendors. The recovery capabilities in IMS are among the best of any DBMS currently available.

One significant recent enhancement to IMS is the Multiple Systems Coupling (MSC) facility, announced in mid-1976 for use under IMS/DC. Aimed at distributing data base processing, MSC supports the switching of transactions between relatively independent IMS systems on distinct processors. Segregation of front-end communications support is also possible.

IMS support seems to have a firm commitment by IBM. Ratings of user satisfaction with IMS tend to fall somewhat below those for other systems, but the number of users speaks for itself. Overall, IMS/VS is one of the most advanced DBMS on the market.

(Continued on Page 106)

IN DEPTH

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INTEGRATED DATA STORE II (IDS/II)

Honeywell Information Systems, Inc.'s IDS/II is the most recent version of a system that was begun in 1961, making it one of the oldest and most respected of all DBMS. Users of IDS/I, which was supplanted by IDS/II in the fourth quarter of 1975, are perhaps the most numerous for any Codasyl system.

Earlier versions of IDS have the additional distinction of having been the prototype for the Coadasyl proposals for standardization of DBMS in the late 1960s. Originally, set concepts were discussed in terms of "master" and "detail" records, as is still the case with Cincom's Total; IDS/I and especially IDS/II, however, represent efforts to stay within the evolution of Codasyl philosophy and terminology.

The most noticeable deficiency of IDS/I in this regard — which is corrected in IDS/II — is the lack of an independent data description language (DDL).

IDS/I, originally written for the General Electric 200, is now operational on the HIS Series 600, Series 6000 and Series 60 Level 66 computers under the Gcos operating system. IDS/II is available on all of these machines except the 600.

On-line processing, which operates under the Gcos Time-Sharing Executive, is extended with the IDS Data Query System and the Management Data Query System (MDQS).

Interaction with the IDS data base is accomplished using Codasyl data manipulation verbs, which under IDS/I must be preceded by an "Enter IDS" statement. Interfaces to languages other than Cobol are planned for IDS/II. Additional data base creation and processing capability is supported under MDQS IV.

Other enhancements included in IDS/II are the following:

- An independent subschema description language.
- A device media control language for increased control of mapping to physical devices.
- Complete Codasyl privacy and security facilities.
- Support for variable-length records.
- Implementation of an indexed-sequential file access method.
- A data dictionary facility.
- Support for secondary indexing to allow partial inversion of network files.
- Interactive IDS/II, using language largely similar to the regular DML.
- A data restructuring utility.
- IDS/II, like IDS/I, offers the full range of storage structuring provided by the Codasyl specifications and makes data networking available as the user requires.

With the release of IDS/II, HIS has addressed many of the deficiencies in IDS/I. A centralization of data management routines and buffer pooling promise to reduce core overhead and to facilitate data access for multiprogramming. A general improvement in performance is to be expected.

Also addressed by IDS/II is the serious compromise of data independence occasioned by lack of an independent schema DDL. In IDS/I, for example, data base description must appear in every application program (usually with a COPY statement); because of this, modifications in the description require extensive program recompilation.

Restriction of user languages to Cobol and MDQS is undesirable but temporary. Given a firm commitment by HIS for seeing IDS/II through its initial installation period in 1976 and 1977, the system has excellent potential for complete data base service.

IDS/I, which has users boasting the longest continuous experience with any DBMS, is a solid product. Many of these users can be expected to migrate to IDS/II, continuing their prosperous association with the IDS software line.

* * *

DATA MANAGEMENT SYSTEM (DMS 1100)

DMS 1100 is Univac's contribution to the data base management field. To date the system itself has not been "unbundled," making its position

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T-80 THERMAL PRINTER—80 CPS

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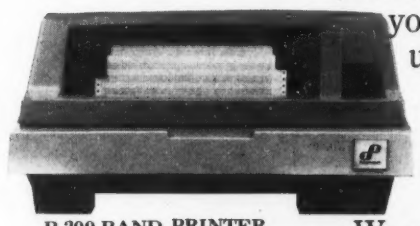

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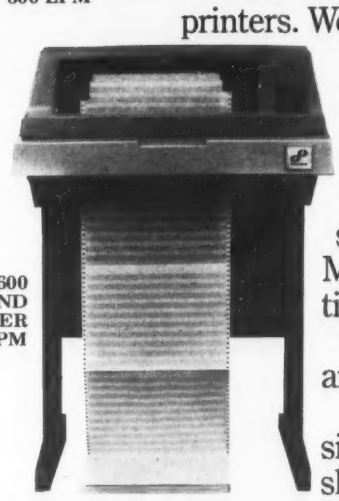

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Altogether a varied and versatile lot.

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And we back up that built-in dependability with a system of in-depth support for our

2230 LINE PRINTER 300 LPM

somewhat unique among DBMS.

DMS 1100 is an overlapping subset of the Codasyl data base specifications. In some cases, data-handling features have been added or extended; in others they have been omitted. Several of the most noticeable omissions are the lack of support for privacy locks — an important data security feature — and for the Codasyl subschema facility.

DMS 1100 is available for use on the Univac Series 1100 hardware.

A Transaction Interface Package (TIP) is available as a communications monitor interface. Access to DMS 1100 data bases by time-sharing users is supported by CTS.

Application programming under DMS 1100 is through Cobol source code. Fourteen of 16 data manipulation verbs proposed by Codasyl have been implemented, and several additional verbs have been added to enhance procedural capabilities, especially for recovery, error handling and multiprogramming.

A preprocessor converts all DMS 1100 verbs to CALL statements. Future releases of special data manipulation statements for other languages, such as Fortran and PL/I, are projected.

Attractive DMS 1100 features include:

• A facility for restoration of "quick before" images from temporary disk storage upon system failure, plus selective or complete data base recovery.

• A facility for command roll-back, which restores the data base to its status before the start of the current command, and for run-unit roll-back, which restores the data base to its status before the start of the run unit.

• An interface with the Total Information Management System (Tims), Univac software for building large information systems.

DMS 1100 supports the three Codasyl access methods: randomized, linked and direct. In addition, an indexed-sequential mode of physical access has been implemented.

Complete network capabilities are available, comparable to any of the Codasyl-type DBMS. In addition, set implementation by pointer array is supported, as well as indexing for sets.

Two important features are now available for DMS 1100: a high-level Query Language Processor (QLP 1100) and a report writer, Remote Processing System (RPS 1100). Both systems, announced in March 1975, are oriented toward on-line processing.

DMS 1100 has better than average data base protection features. The departures from strict Codasyl implementation may cloud the picture for future compatibility, but do in fact provide several positive capabilities. Subschema and privacy lock facilities, as well as a reorganization utility, were reported to be under development in 1977.

Univac, which was one of the first to commence development of a Codasyl-type DBMS in 1969, continues to give the system substantial support.

Given continued development and adherence to Codasyl standards, DMS 1100 has strong potentials for future growth and dissemination. Significantly, DMS 1100 appears to have a central role in Univac's marketing strategy for the coming years.

A number of observers group DMS 1100 along with IMS/VS and IDS/II as definitive of the state of the art among currently implemented DBMS.

* * *

DMS/90

DMS/90 is Univac's small computer counterpart to its major DBMS offering, DMS 1100. The system has been available since November 1974.

DMS/90, like DMS 1100, is a Codasyl-type DBMS. In spite of the fact that it is marketed by Univac, DMS/90 is actually more closely related to Cullinane Corp.'s IDMS than DMS 1100 since both DMS/90 and IDMS were fathered by the same development effort at B.F. Goodrich in 1970 and 1971.

DMS/90 is interesting in several respects. As with DMS 1100, the software to date has not been unbundled by Univac. Moreover, Univac's support of both large and small computer DBMS represents an attempt to provide an avenue of evolution for smaller computer users in an area not before

(Continued on Page 108)

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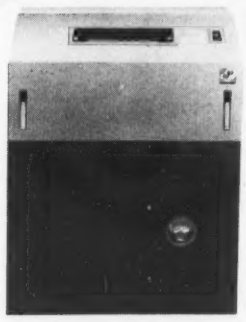
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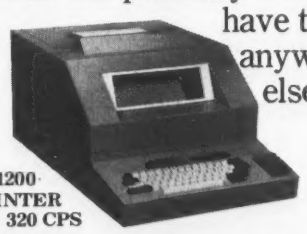
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IN DEPTH

(Continued from Page 107)

attempted: data base systems following Codasyl standardization.

However, complete compatibility between DMS 1100 and DMS/90 has not yet been achieved, a fact complicated by the distinct hardware boundary between Univac's large and small computer lines.

DMS/90 is available on Univac's Series 90 (90/60, 90/70, 90/80) under VS/9; the Univac Series 70 (formerly RCA) under VS/9; and the Univac 90/30 under OS/3. The 90/60 and 90/70 machines fall approximately into the range of IBM's 370/138 and 370/148.

Application programming is accomplished in Cobol, using a subset of the Codasyl DML verbs. A preprocessor converts DMS/90 code to CALLs.

DMS/90 fails to implement full Codasyl standards in the following areas:

- Only 12 of 16 Codasyl verbs are implemented.
- Privacy provisions, excluding that provided by the subschema facility, are not supported.
- Capability for set mode of pointer arrays and set occurrence selection is not provided.

DMS/90 supports full Codasyl data networking, including the three principal location modes. The DMS 1100 Codasyl enhancement for supporting indexed-sequential access is not implemented.

Utilities currently exist for data base initialization and recovery, backup and storage statistics. DMS/90 has somewhat larger real core requirements than Hewlett-Packard Co.'s Image/3000 (estimated at 131K bytes for the 90/30 and 262K bytes for the 90/60 and 90/70).

Important enhancements were scheduled for 1976: reentrant coding of DBMS modules for multiuser support; on-line recovery features; and implementation of a Device Media Control Language (DMCL).

One especially interesting development area is the integration of IMS/90, an additional Univac data management system. IMS/90 is described as a generalized on-line storage and retrieval system supporting access to direct, sequential and indexed-sequential files.

A number of interesting features are supported: a high-level query/update language (Unique), a communications interface, password security and recovery functions.

The future of DMS/90 is difficult to predict. Development of the system continues at this date and has already corrected a number of early shortcomings. Interesting because it brings mainframe data base management to medium-size users, DMS/90 is caught up in an intense hardware confrontation taking place in that arena. Its future is also clouded by Univac's 1977 acquisition of the Varian hardware line.

DMS/90 is clearly an indicator of important trends in the data base field and should be watched closely in the next several years.

* * *

DATA BASE MANAGEMENT SYSTEM-10 (DBMS-10)

DBMS-10, another of the Codasyl-type DBMS, is marketed by Digital Equipment Corp. The system is also available on the communications network of Rapidata, which was responsible for its design and development. The system was initially available in mid-1973.

DBMS-10 is perhaps not as advanced as some of the other mainframe Codasyl systems, although development continues. One area especially criticized has been its deficiency in supporting concurrent access, a weakness that DEC has moved to correct in the past year or so. A subschema facility is supported, but its scope is relatively limited.

DBMS-10 is implemented for the Decsystem-10 and Decsystem-20.

On-line processing is available through the Decsystem-10 monitor, which is complemented by DBMS-10 reentrant modules.

Application programming against DBMS-10 data bases is accomplished in Cobol or Fortran host languages. Recently released by Rapidata is X2C, a high-level nonprocedural language

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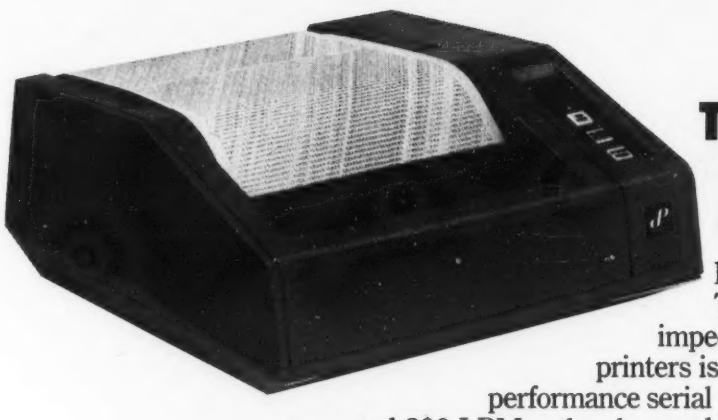

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that has a number of positive features:

- Interface with special dictionary file(s) in which comprehensive structural information is kept on a selected basis.
- Compilation of source code rather than interpretation so that object code may be kept for later execution.
- A powerful report generation feature.
- Computational looping and input/-output facilities built into the language.
- A powerful DML syntax that substantially reduces the effort required for application development.
- A data base creation and update capability.

DBMS-10 provides complete data networking, including a facility for sequential access.

Utilities are provided for initialization, print, schema update and statistics. Recovery has been cited as somewhat lacking, and a utility directed at this area is reported to be in the works.

Documentation, at least of the tutorial variety, is excellent, better than for most DBMS. The data dictionary facility to be featured by X2C is especially noteworthy in several respects.

First, it supports all files that comprise the "data base," whether merely sequential or truly structured. Secondly, multiple dictionaries are created, which in the case of DBMS-10 files identify subschema and schema so that different logical views are presented to different sets of X2C users. Finally, data description is enhanced in several ways. X2C should be watched closely as a significant extension of DBMS-10 usability.

With the release of DBMS-10 for the Decsystem-20 and of DBMS-11, a minicomputer DBMS for the PDP-11, DEC has now established a complete range of data management support, from the larger user on the one hand to the medium-size and smaller user on the other. It is significant that Codasyl DBMS software is the common denominator in the various data management offerings.

DEC is rapidly moving toward a position of growing strength in the computer industry; its offerings should be watched closely for this reason.

In addition, DEC is beginning to shed much of the reputation it once had for lack of interest in software products. This development is, of course, generally true for the mini manufacturers and is indicative of increasing confrontation with the traditional mainframers.

* * *

DATA MANAGEMENT SYSTEM-II (DMS-11)

Burroughs Corp.'s DMS-II is a highly innovative system that is outstanding, by comparison, in operational performance. The system was first announced in October 1974.

DMS-II represents a significant departure from Burroughs' previous DBMS offering, DM6700, in several important ways. Perhaps the outstanding difference is the integration of various data base management routines into the operating system itself, which has a noticeable effect on data retrieval speeds and helps reduce overall core requirements.

DMS-II also represents a departure from Codasyl standards, although there is some overlap in philosophy.

DMS-II runs on Burroughs B6700 and B7700 series computers under the MCP operating system. Newly released is support for the B1700 series.

For large-scale communications networks, DMS-II can be interfaced with the Network Definition Language (NDL) and Message Control System (MCS).

Application programming against DMS-II data bases is supported directly in Cobol, Algol, and PL/I through use of 17 verb commands. No preprocessing of the source code in these languages is required since DMS-II extensions to language compilers are supplied.

Performance-oriented features of DMS-II include:

- Loading of reentrant data set access routines into main memory upon issuance of an INVOKE statement to act as MCP intrinsics.
- Implicit "frees" of data sets after se-

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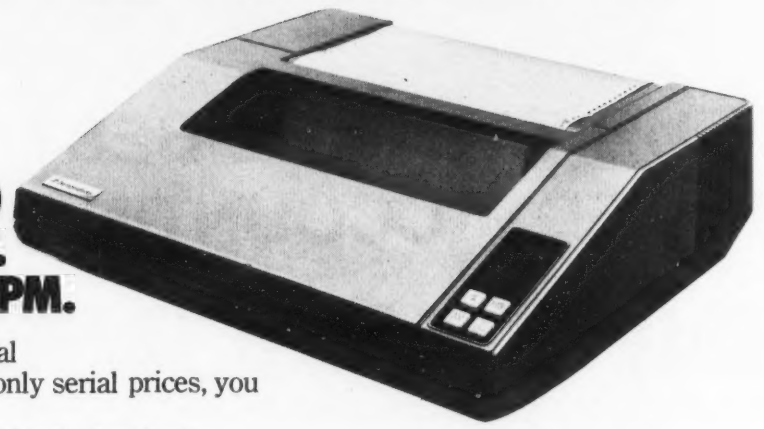
RODUCTS G DOWN?



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(Continued from Page 109)

lected data base operations.

• Isolation of on-line transaction error to a disk page in order to allow for continued processing with concurrent reconstruction of the page.

• Optional construction of bit vectors, representing data base content under given selection criteria, to improve the speed of data base inquiry.

DMS-II access methods, of which bit vectors are only one, include six others: indexed sequential, indexed random, random (calculated), direct, ordered lists and unordered lists. Basic file organization is supported in four modes: sequential, random, indexed sequential and indexed random.

Conceptually, a DMS-II data base is organized into data sets and sets, which provide significant networking capability. Data sets, which may be either "disjointed" or "embedded," define basic storage patterns by which data are physically organized. Linkage between data sets, in any of five options, provides internal network paths.

External data organization is supported by data inversion, by which "sets" of data are formed. Data access from sets may be improved by formation of "subsets" and by storage of selected data.

DMS-II includes a report-writing feature and a query language, Inquiry. DMS-II is clearly unique among DBMS in several respects. First is the balance that Burroughs has achieved between physically linked structuring ("data sets") and inversion ("sets"); this enables the user to tailor his data base to his needs.

A second unique feature, mentioned earlier, is the merging of selected DBMS routines with the operating system. Also, the capability of source language compilers to process data manipulation verbs directly is notable.

One questionable feature of DMS-II is the extent of programmer control over audit/recovery logging. Some argue that this capability is error-prone and undesirable in terms of data independence.

Security, which is largely borrowed from the operating system, could be improved. One significant deficiency is the lack of a subschema facility.

Overall, DMS-II is complex but nonetheless fast and relatively easy to use. Documentation has been somewhat lacking.

DMS-II users are particularly enthusiastic about Burroughs' data base system. Given its special characteristics, DMS-II is clearly a system to watch in the data base field, especially as its facilities for data structuring become more widely understood.

* * *

DMS-170

Control Data Corp.'s DMS-170 is one of the more innovative systems on the market. It attempts to bring together inverted structures and Codasyl concepts under something of a relational umbrella.

Components of DMS-170 — for example, Query Up-date — have been available for some time; others have been marketed within the last year or so. Particularly significant in this regard is the Cyber Data Base Control System (CDCS). Only a few users currently employ DMS-170 in full form.

DMS-170 is perhaps a prime example of an implementation of the complete data management concept. Many components are thoroughly data base in orientation; others — for example, the Cobol compiler and the Sort-Merge processor — fall outside the traditional definition of a DBMS.

Lower level file processing is supported in DMS-170. The loose packaging of these various components into DMS-170 is designed to give a holistic concept of data management

(Continued on Page 113)

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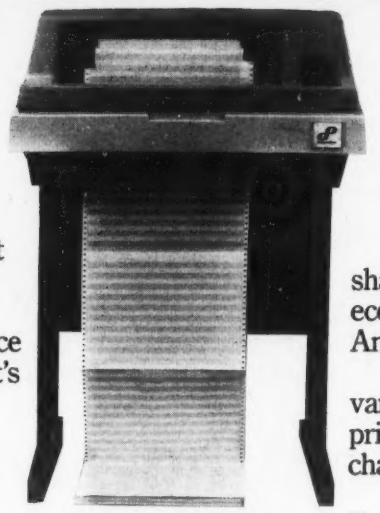

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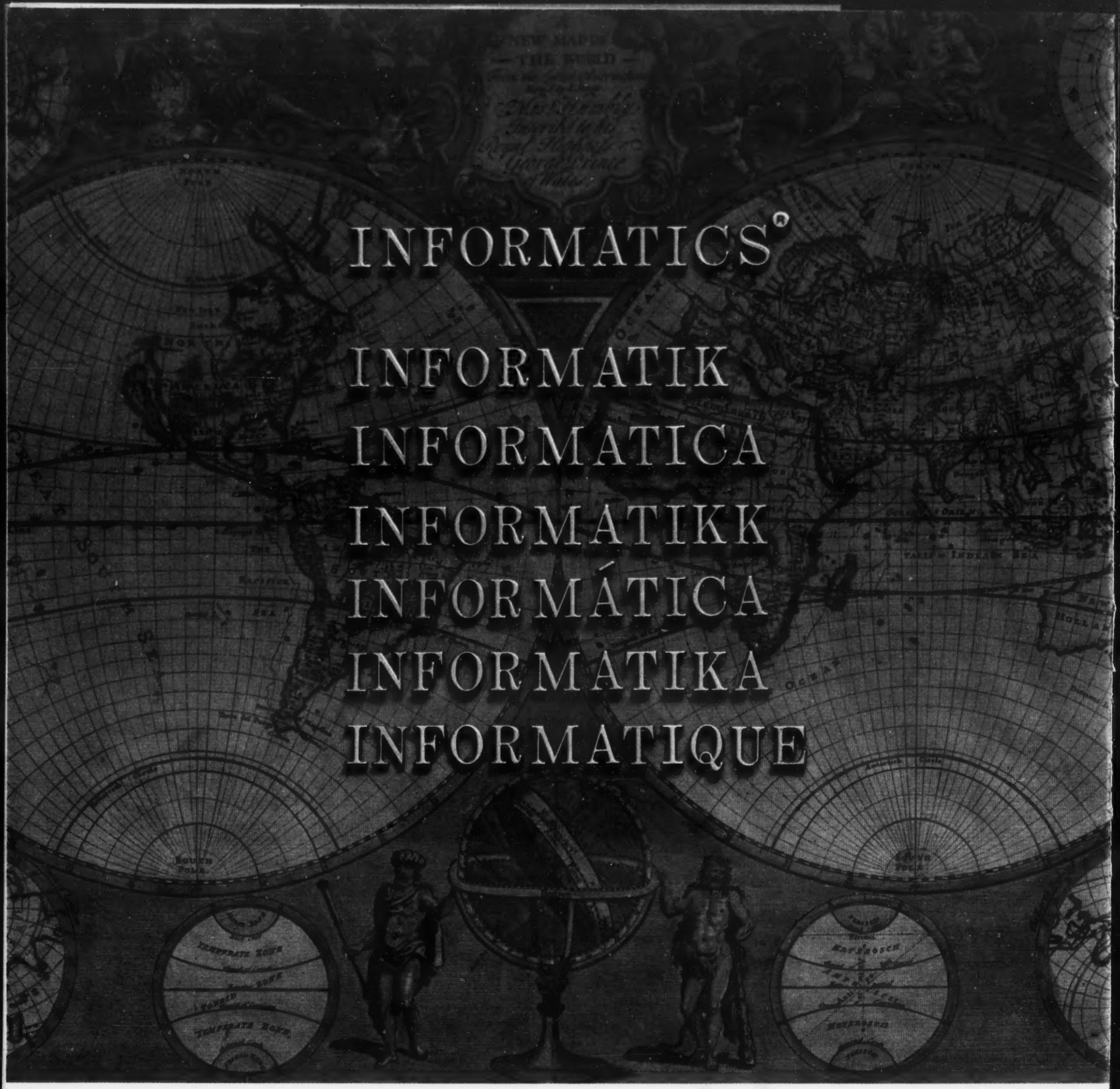

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(Continued from Page 111)

and of a machine function.

Hardware for DMS-170 includes the CDC Cyber 170 series; Cyber 70 series, Models 72, 73, 74; and the 6000 series, under Scope 3.4 and NOS 1.0.

DMS-170 is used directly in Cobol and via CALLs in other languages. The self-contained user-oriented language, Query Up-date, may be used for DMS-170 interface. The Cobol Data Manipulation Language (DML) is very similar to traditional Cobol I/O commands, but dissimilar to Codasyl specifications.

Basic data structuring in DMS-170 is through inversion. To relate records, a JOIN operator is specified in the DDL (establishing an equivalence between a common data element), and the logical concatenation of record types is given a special relation name.

A user requesting access to this relation name (via a Cobol READ) receives a physical concatenation of records that have been aggregated by the DBCS using index information.

One important feature of DMS-170 is that files involved in data base relationships are concurrently available to processing outside the data base, even for updating. This avoids a lock-in of the data and yields flexibility to the application environment.

Users of IBM's IMS and similar systems have no such capability; in IMS, for example, a file is always an IMS file, even if internally Vsam or Isam. Overall, DMS-170 is geared toward allowing a smoother transition to the data base environment than possible under many DBMS.

DMS-170 is not yet widely known in the market because CDC has not been particularly well known in the past for data management. Its borrowing from both the Codasyl specifications and relational theory has been called flippant by some, imaginative by others.

Although DMS-170 has parallels in other systems — Infodata Systems, Inc.'s Inquire and Software AG's Adabas in particular — it is definitely unique among the DBMS offered by mainframe companies, which have generally not tended as strongly toward inversion. DMS-170 also supports subschemas and data independence to the data item level.

The future of DMS-170 — especially its performance in large data base environments — will be interesting to watch. Like Burroughs' DMS-II, it is likely to become better respected as its facilities become more widely understood.

* * *

TOTAL

In terms of the number of current users, Cincom Systems' Total is IMS' most serious competitor for IBM hardware. Unlike IMS and most other DBMS, however, Total has not been limited to a single hardware line but has been implemented in a number of hardware environments. Total users are the most numerous for any DBMS.

Total consists of several modules of phases, one of which is also called Total. Compared with IMS, data handling under Total is extremely streamlined and direct, with relatively little loss in efficiency, except perhaps for large and less static data bases.

The Total user is restricted to two basic types of records: a single-entry "master" record and a variable number of owned "detail" records. These record types may be interrelated in such ways as to model most types of complex data structures. These data structures or "networks" borrow significantly in concept from early versions of IDS software.

The first version of Total was made available in early 1969. Current versions of Total are available for the machines listed in Figure 2.

On-line processing in the IBM environment is often supported in conjunction with Cincom's Environ/1 or Informatics' Intercomm.

Application data handling uses CALL statements, with appropriate parameters appended. Host languages include Cobol, Fortran, PL/I, RPG-II and Assembler. Total data-handling language has little in common with the current Codasyl specifications.

Data base security features include:

- Dynamic data base logging of before- and after-images.
- With Environ/1, automatic warm or cold restarts in either real-time or on-line modes.
- Utilities for periodic data base dumps.
- A task "hold" facility for the prevention of concurrent update. Under a multitask version of Total, multiple application programs may share the same data base.

Data structuring under Total is somewhat like that of the Codasyl model, although terminology and implementation differ significantly. The Total network does not have the full range of Codasyl capabilities; for example, a record type must always be either an owner (a master record) or a member (a detail record); it cannot be an owner in one set type and a member in another.

This restriction prohibits the direct relationship of master records of different types or detail records of different types. One implication of this is that a hierarchy in Total can never be directly expressed with more than two levels.

An additional restriction is the lack of support for variable-length records. Access to master records is strictly randomized.

Total has been criticized for these and other aspects in data structuring. Nonetheless, certain of these features have positive implications for performance and space economy — one reason why Total has had initial successes in the minicomputer environment.

Compared with IMS, Total's consumption of resources is modest. Unlike IMS, Total supports data independence to the level of individual items, because CALL arguments specify individual items rather than an entire record to be accessed. Subsets of the data base can be formed for a given program in subschema-like fashion.

Manufacturer	Hardware Line	Operating System
Burroughs	2500, 4800	MCPV
CDC	6000/Cyber 70, 170 3000L	SCOPE, KRONOS, NOS MASTER
DEC	PDP/11/34, 11/70	RSX, IAS
Harris	S100/S200 Series	VULCAN
Honeywell	200/2000 Series Level 62 Level 66/6000 Level 6	Mod 1, OS2000 GCOS GCOS GCOS
IBM	360/370 System/3 Models 8, 10, 12, 15	DOS, DOS/VS, OS, OS/VS, SVS, MVS SCP/CCP
ICL	1900 Series	GEORGE
Interdata	7, 8/32	OS 32
NCR	Century Series Criterion Series	B Series RS1, VRX
RCA/UNIVAC	Series 70	DOS
Siemens	4004	BS-1000
UNIVAC	9400/9700 90/60, 70, 80	OS/4 VS9
Varian	V70 Series	VORTEX II

Figure 2: Hardware lines and operating systems for Cincom Systems' Total.

Proponents of Total are particularly vocal in their praise of the system and, for many IBM 370 users, Total represents an important alternative to IBM's IMS.

Although in some respects not as advanced as other DBMS, Total is nonetheless impressive in a number of ways: its cross-mainframe implementation, its early successes in the minicomputer field and its accumulation of a sizable user base.

Cincom is one of the most successful vendors of independent software and as such has contributed significantly to the evolution of DBMS software.

* * *

INTEGRATED DATA BASE MANAGEMENT SYSTEM (IDMS)

Cullinane Corp.'s IDMS is one of the most attractive data base packages currently available for IBM hardware. Although only recently marketed (May 1973), the IDMS user base has expanded rapidly.

IDMS was specifically designed to comply with the Codasyl specifications and remains to date the only major DBMS of this type commercially available for IBM hardware. IDMS software, which was designed by B.F. Goodrich in 1970 and 1971, has since been adapted to several other hardware lines, including Univac's Series 90 (where it is known as DMS/90) and DEC's PDP-11 (DBMS-11). In this latter environment, IDMS has the distinction of having been the first mini DBMS of the Codasyl type.

IDMS is available for IBM 360 and 370 systems under DOS, DOS/VS, OS/MFT, OS/MVT and VS. Support is also extended to the Univac Series 70, although Cullinane no longer actively markets in this area.

A Generalized Communications Interface (GCI) allows IDMS coupling to most telecommunications monitors, including CICS and Intercomm. In late 1976, marketing support was announced for a teleprocessing monitor, Shadow II, allowing a more integrated data base/data communications (DB/DC) environment for IDMS users.

IDMS may be used with any host language (for example, Fortran, PL/I, Assembler) that supports a CALL statement. For Cobol, a special set of data manipulation statements is available for data-handling functions.

A special section within the Data Division allows the user to invoke a subschema (a subset of the data base data description) for use by his program. All special functions, such as the above, are supported by a precompiler.

IDMS features several attractive items:

- Privacy locks for greater access control.
- Data base recovery routines, including journal roll-forward and roll-back of data base files.
- A Central Access Monitor Program (Camp) that provides for multitask processing.
- An integrated data dictionary system, including a facility for automatic data description in programmatic form (Cobol).

Data structuring under IDMS follows the Codasyl specifications for networks. Recently announced were significant extensions to previously supported storage techniques, including support for sequential structures, for primary and secondary indexing and for a generic key retrieval capability.

Available with IDMS is an integrated version of Culprit, a powerful report generator. Cullinane has recently begun to emphasize the total data management concept with the packaging of a number of system components into the Cullinane Data Management System (CDMS).

Components of this package include IDMS itself, teleprocessing support, an on-line query facility, a data dictio-

(Continued on Page 115)

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(Continued from Page 113)

nary and various output genrators under Culprit. Cullinane is also pursuing the back-end DBMS concept under DBMS-11, which it calls IDMS-11.

Cullinane is in a solid position of strength as the industry looks increasingly toward the Codasyl specifications and toward new concepts in data management, such as back-end DBMS. IDMS is a popular system and one whose growth continues.

* * *

ADABAS

Adabas is a full-scale data base management system produced by the German-based corporation Software AG. At least one-half of its current users are in North America.

Adabas, which finds its forte among medium-size to large application environments, is comparable in general data-handling capabilities to any of the other major data base systems. Adabas is unique, however, in providing an integrated data compression facility from which significant savings in disk storage, as well as de facto security, may accrue.

Adabas is supported on IBM 360 and 370 systems under DOS, OS and VS.

Teleprocessing interfaces are available for TSO, CICS, Intercomm, Task/-Master and Environ/1. Software AG recently released its own teleprocessing monitor, Complete, signaling a move in the integrated DB/DC direction.

Application program interface is effected through CALL statements within Cobol, Fortran, PL/I or Assembler source languages. A special Adabas query language, Adascript, supports high-level retrieval requests in a stand-alone fashion. There is no overlap with Codasyl specifications.

A relatively new facility receiving increasing emphasis is Adamint, a "macro" software facility that allows the creation of high-level, customized user views of the data base.

Attractive Adabas features include:

- An auto-restart capability that allows the resumption of data base activities immediately following an interruption.
- A restore capability for recovery from hard read errors.
- A restart capability, which restores before-images following abnormal program termination.
- Special security capabilities, including support for 15 gradations of access security and for data ciphering.
- A phonetization utility for improving search results.

Under Adabase data structuring, as with MRI Systems Corp.'s System 2000, all logical data element relationships are given physical expression in a segregated portion of the data base. These inversion techniques result in a considerable reduction of the overhead associated with file reorganization and data base searching.

A record in an Adabas data base is a simple physical hierarchy in which an effective limit of only one or perhaps two levels is possible. The true power of Adabas arises from the indexing of

(Continued on Page 116)

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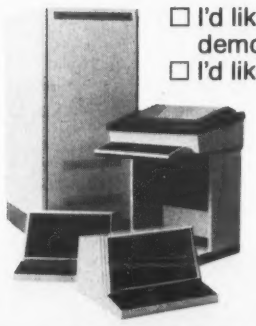

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IN DEPTH

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these records and from the mapping of indexes for elements of the same type (that is, elements taken from the same domain) appearing in different record types. This process, called coupling, results in two matched lists, which represent a bidirectional "linkage" between record types.

Adabas has been praised for its element-level independence, which is possibly as extensive as in any DBMS currently available. Not only is access possible at the element level but, significantly, file reorganization is not necessarily required should a field type be added to a record type.

This allows a flexibility for growth far beyond many other DBMS. An additional level of independence is possible under Adamint.

In these and other respects, some observers feel Adabas approaches a measure of the separation between logical and physical concerns that is envisioned by the relational model.

Development of Adabas facilities continues in a number of areas. An integrated report generator, Adawriter, was released in the second quarter of 1975. Software AG is known to be active in the development of minicomputer systems.

Some critics originally questioned whether German-based Adabas developers could give adequate support to North American installations (Adabas was released in 1970 and was marketed in the U.S. in 1972). The question now seems moot.

Adabas is an attractive system, which overshadows its monolithic competitor IMS/VS in a number of respects. Overall, Adabas is one of the foremost representatives of the class of inverted DBMS.

* * *

SYSTEM 2000

MRI Systems' System 2000 is one of the best-known DBMS in the field, with implementations for Univac and CDC computer lines as well as for the IBM 360 and 370 environments. Estimates of the current number of users falls somewhat below 200.

System 2000 has also had notable success in the remote computing field, where it is offered by some 15 sources and is used by as many as 350 organizations.

In terms of overall system complexity, System 2000 falls somewhere between the extremes presented by IMS and Total. Data base administration, however, is probably less difficult with System 2000 than with either of these systems. System 2000 emphasizes the construction of efficient indexes to data records, based on inversion of individual data fields.

System 2000 is currently implemented on several manufacturers' mainframes: the IBM 360 and 370 series; Univac Series 1100; and CDC 6000 series and Cyber 70 and 170 systems. System 2000, like Total, is noteworthy in this cross-mainframe implementation.

System 2000 is interfaced with teleprocessing monitors such as CICS or TP 2000 (the latter also marketed by MRI). The System 2000/TP 2000 combination is highly rated by many sources. A recent enhancement provides a Tcam interface.

The Immediate Access Feature of System 2000 allows user interface with the data base through a high-level language consisting of English-like commands, System 2000 also has host language support for Cobol, Fortran, PL/I and Assembler.

In Cobol, Fortran and PL/I, special verbs are used to effect data handling. These verb statements are converted to appropriate CALL statements by a System 2000 precompiler. There is no significant overlap with Codasyl specifications.

Attractive features of System 2000 include:

- A multithread feature, which allows multiple application access to the same data base (concurrent update is controlled).
- A facility for an audit trail, which may be used for backup.
- Field- and segment-level security, provided by password options.

System 2000, along with Adabas and perhaps several other DBMS, forms a class of systems distinct from others by its emphasis on data inversion. Unlike many other inverted DBMS, however, System 2000 emphasizes

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hierarchical data structuring, with up to 32 levels in a given tree. Trees are "put together" by tables (called "hierarchical location tables") that are external to the actual data but also separate from field indexes.

Although powerful in a number of respects, some critics have argued that the hierarchical approach of System 2000 does not achieve the data networking possible in other DBMS.

MRI has striven to demonstrate that System 2000 as an inverted DBMS does not necessarily engender more overhead in update processing than physically linked counterparts and that data retrieval and data independence are notably better in the former than in the latter. System 2000, first released in 1970, is one of the oldest independent DMBS and one of the foremost inverted systems.

MRI has recently released a data dictionary system for System 2000, called Control 2000, a step closer to the complete data management concept. Backup facilities have been improved, and a report writer has been available for some time. MRI is also active in minicomputer system development.

System 2000 is notable in its successes in cross-mainframe implementation and in the remote-computing field. It will certainly continue in its role as a major independent DBMS.

* * *

DATACOM/DB

Datacom/DB is an inverted DBMS marketed by the Insyte Corp. (formerly Computer Information Management Co.), which also markets Datacom/DC, a teleprocessing monitor. Taken together, these products are called Datacom.

A major feature of the Datacom system is its integration of data base and communications handling. The DC portion was in fact developed before the DB portion; the latter became available in 1973. Either product, however, is available separately, and a variety of successful configurations are reported by the vendor.

A data base in Datacom terminology includes a control file (containing data base definitions and other information), a single integrated index and up to 240 indexed files.

Datacom/DB runs on IBM hardware, from the 360/30 through the 370/158.

Teleprocessing support is oriented primarily toward Datacom/DC, although Datacom/DB may be interfaced with other monitors, in particular CICS.

Application programming is effected by CALL statements, by which element-oriented parameter lists are passed to the control system. In addition, a query language is supported under Datacom/DC.

Several important facilities in Datacom are the following:

- A multi-DB capability, supporting access by an application program to as many as 240 Datacom data bases.
- A multiuser facility that allows multiple users to access Datacom data bases through a central multithreaded copy of the control system
- Dataquery, a high-level terminal-oriented query language.

Storage structuring in Datacom/DB is based on the concept of inverted lists. Records are added to data files in load sequence; all access to the data is via index entries.

Up to 15 fields per file may be inverted (a given field need not be contiguous); a total of 255 keys per Datacom data base are supported.

Within the index for the data base, all entries from the various files are intermingled, which results in the aggregation of pointers to all like-valued records, regardless of the file which contains them. (The correspondence of inverted fields in different files is established prior to loading).

A given entry associated with an index key value thus contains both a record pointer and file identification; this information allows various combinations of retrieval options for access to related data. Nonindexed "searchable" fields may also be defined.

Datacom/DB is oriented toward performance in on-line environments, in some cases trading optimum space management (for example, reclamation of deleted record space) for speed.

Certain features are available, however, for improving space management, among them a provision for "slack" space in record files and a compression feature for eliminating certain repeating characters.

An additional capability is offered for improving performance for some sequential tasks ("native key" processing in Datacom terminology), whereby buffering techniques speed access to records loaded in sequential order.

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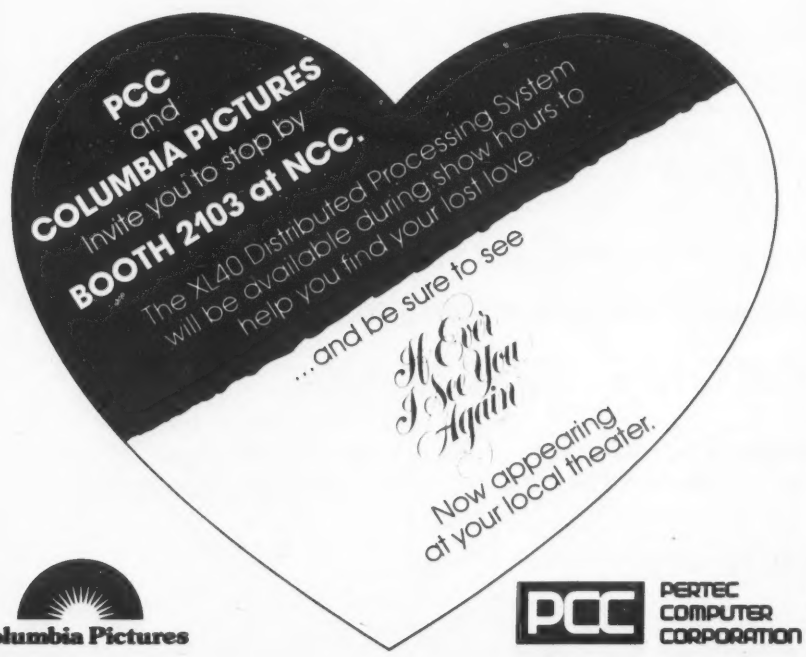
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However, reorganization is occasionally required to maintain this and other desirable features.

Security in Datacom is supported to the data-element level. Insyte has recently taken significant steps to improve Datacom documentation.

The user base for Datacom/DB is among the most rapidly expanding for newer DBMS, and Datacom/DB itself is now considered, along with systems such as System 2000 and Adabas, to be among the top three or four inverted DBMS for IBM hardware.

* * *

INQUIRE

Inquire is an inverted DBMS that exhibits a number of interesting features. It is sold by Infodata Systems, Inc.

Inquire has been on the market for some time (the original release appeared in 1969), but the early version could not be called a full-scale data base management facility. Although Inquire retains something of its original information storage and retrieval flavor, recent upgrades have greatly enhanced its capabilities.

The most important of these are the multiple data base capability (1974), the procedural language interfaces (1975) and the CICS interface and backup/recovery facilities (1976).

Inquire runs on IBM 360 and 370 systems under the OS and VS operating systems. Support for Inquire under CICS, TSO, IMS/DC or CMS is available.

Application programming is via CALLs in Cobol, PL/I, Fortran or Assembler; a self-contained, free-format command language with query capability is supported in either batch or on-line modes.

Inquire's method of indexing is its own and does not closely resemble that found in Adabas, System 2000, Datacom/DB or other inverted DBMS. Each record in an Inquire data file is represented by a surrogate, which contains indexed values for that record in coded form.

These surrogates, which are located in a search file, are chained together on the basis of like values for given fields. The actual value for the field resides in an index file, which points to the top of the appropriate chain in the search file and includes a count of the number of entries in the chain. This information may be used to optimize searching.

There are no actual linkages between Inquire data files. When a user wishes to relate records in separate files, a CONNECT statement is issued that gives the DBMS sufficient information to map together the indexes of an inverted data element common to the two record types.

Data independence to the data item level is supported, but the lack of a subschema capability is notable. One of Inquire's strongest features is its text-handling capability — an area largely ignored by most current DBMS.

One enhancement in this area was recently developed: a proximity-searching capability for string analysis and document retrieval.

Infodata is pursuing development toward interfaces with word processing systems. At the same time, Inquire has developed in more or less the opposite direction, toward more traditional data base applications, such as payroll and inventory.

Although the system has proven viable in these areas, some critics have argued that Inquire is not as stringent about data integration as other DBMS.

Inquire brings together notable features in a somewhat unique approach to the data management problem.

* * *

MODEL 204

Model 204, marketed by the Computer Corp. of America, is a flexible DBMS, although somewhat less well known than various of its counterparts. Data access under Model 204 is primarily by data inversion, placing it in a class with System 2000, Adabas and others.

Model 204 is supported on IBM 360 and 370 systems under OS and VS. Full-scale teleprocessing may be supported under CICS and Intercomm. For smaller scale user-oriented functions, Model 204 has a set of built-in teleprocessing modules.

Host languages for the batch environment include Cobol, BAL, PL/I and Fortran, using CALL statements. Especially for on-line users, Model 204 offers a completely self-contained language, oriented to easy interactive inquiry, although it may also be used for updating and for batch processing.

Attractive features of Model 204 include the following:

- A multithread option for improvement of throughput.
- Data security to four levels: records, record sets, files and devices.
- Checkpoint/restart facilities using an audit trail.
- Data compaction and free-space chaining, both of which improve storage.
- A field-level option for data encoding.

Storage structuring under Model 204 is accomplished primarily by the inversion of multiple fields so that runtime requests can be satisfied by comparison of index values rather than by search of actual data. Several options, however, are supported for controlling the physical storage of records so that batch processing — including sequential report tasks — can be improved.

Model 204 exhibits flexibility in system configuration, allowing the user to tailor operational support to his needs for on-line and batch processing. The user language is rated highly and is relatively easy to learn.

Model 204 is notable in its attention to search capabilities; it provides a set of powerful relational operators and numeric "range" retrieval. Another unusual feature is the provision of integrated math options.

System overhead is reported not to be

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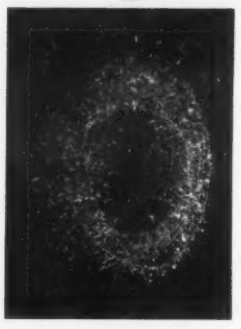

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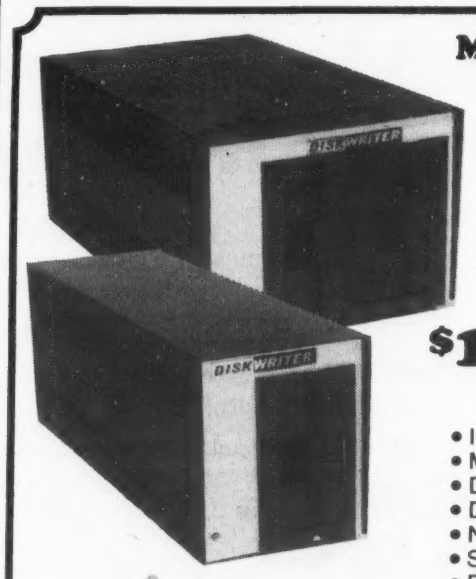

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(Continued from Page 119)

excessive, given cautious inversion. One useful performance-oriented option is the capability to defer index updating, although this may degrade data value in some cases.

Model 204 has not yet been proven, in terms of the number of users, to the same extent as other DBMS. Overall, the system is noted for flexibility and careful design.

* * *

IMAGE/3000

Hewlett-Packard Co.'s Image/3000 is a remarkable system that brings full DBMS services within reach of the users of smaller, less expensive computer systems. At the time of its release in mid-1974, the system was the first mini DBMS to be offered by a major minicomputer manufacturer.

Image/3000 follows the network model and closely resembles Total in a number of respects. The system itself runs on a machine with a minimum 128K bytes of real core. Formerly, a single data base data set (file) could not exceed 47M bytes — the capacity of the HP disks — but this restriction has since been removed.

Image/3000 is capable of handling most medium-size applications, at a software cost of about 20% to 40% of larger DBMS.

Image/3000 runs on HP 3000 computers under the MPE/3000 operating systems. Two smaller versions of Image software are available: Image/2000 for the HP 2100 under DOS-III and Image/1000 for the HP 21MX series under RTE-11 and RTE-111.

Telecommunications are supported by operating system software and are complemented by Image software.

Application programming is accomplished by CALL statements within host languages Cobol, Fortran, Basic, RPG or SPL (HP's high-level system programming language). A high-level interactive user language, Query, is available at a modest additional cost.

Attractive Query/3000 features are the following:

- Complete update capability, including immediate availability of data for retrieval.
- Support for multilevel Image/3000 security features.
- Tutorial aids, such as syntax assistance, and data base structural mapping.
- Extensive search, edit, sort and report capability.
- Ability to store frequently used procedures to be invoked as needed.

Image/3000 uses a method of storage structuring that features master and detail data sets. Each data set is a collection of records, or "data entries," which consist of individual data items.

For detail data sets, one or more data items are defined as "search items." All data entries having identical values for the search items are chained together (using forward and backward pointers).

For master data sets, a single search item is defined whose values are unique. A given master data entry is then linked with similarly valued chains in the detail data set(s). Access to master data entries is normally calculated (randomized), although serial and direct access is possible.

Storage structuring under Image/3000 has the simplicity and directness of Total and provides generally streamlined access. Some limitations exist — for example, no support is provided for variable-length data entries, and there are no direct means of indexed-sequential access — but these do not prevent full data networking.

Utilities are generally good; security, which is multiclassed and extended to the data item level, appears excellent. Support for a query language is noteworthy.

Although many doubts were raised about Image software upon its release in 1974, the system has since proven itself in a variety of applications and has received a number of favorable appraisals. By pioneering mini DBMS technology and marketing, HP has now achieved a position of strength in the mini data management field.

HP offers Image/3000 as a central feature of a highly attractive line of minicomputer hardware and software that is designed for an opening market of smaller data processing applications. On the whole, the system has potential for significant contributions to DBMS evolution.

* * *

VARIAN TOTAL

Varian Total, first released in November 1975, represents the first of a closely timed set of releases of Cincom's successful Total software for the hardware lines of popular mini manufacturers. These manufacturers presently include Harris, DEC and In-

(Continued on Page 122)

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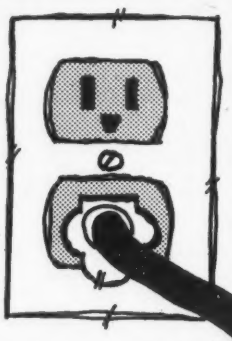

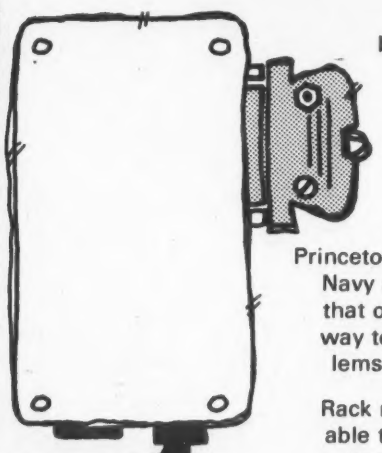

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IN DEPTH

(Continued from Page 121)

terdata, with others likely to follow. Varian itself has since been acquired by Univac — a development of potential significance to mainframe users.

The data base environment envisioned by Varian Total differs little in concept from that in mainframe offerings. The Total network is substantially the same, as are administrative steps in implementing it.

Despite the evident difference in size, there are no theoretical limits on the extent of a Varian Total data base. More than 2,500 master and detail data sets can be defined; practical size limits depend largely on usage and system configurations.

A processor with a minimum of 128K bytes of main memory is required; actual memory sizes in the Varian line have been pushing upward steadily.

One hardware innovation is particularly noteworthy: the use of microcoded firmware to implement the randomization algorithm. An important recent enhancement allows locking for update at the record level.

Varian Total runs on the V70 series under Vortex II. Host languages include any supporting a CALL: Fortran, RPG-II, Cobol and Assembler. No query language is yet available, a deficiency in comparison with Image.

The emergence of a class of systems such as Varian Total is significant in a number of respects. First of all, mini DBMS bring the benefits of data base organization and data independence within the reach of smaller users. While the cost/performance ratio of mini hardware steadily improves, the availability of software is increasingly a factor.

Secondly, the existence of mini DBMS with mainframe counterparts raises the possibility of back-end configurations, from which numerous benefits to larger users can accrue. Such systems bring the day of distributed data bases one step closer.

* * *

DBMS-11

With the release of DBMS-11 in mid-1976, Digital Equipment Corp. extended in Codasyl compliance to its minicomputer line, the popular PDP-11. Although DBMS-11 is actually an adaptation of Cullinane's IDMS software, it nonetheless complements DEC's mainframe Codasyl offering, DBMS-10.

The DBMS-11 implementation is relatively extensive, especially for a system in its initial releases. Support for concurrent usage, subschema definition, recovery and other features is evident.

The DDL and DML syntaxes are in close compliance with Codasyl specifications; network implementation is by physical linkage.

Initial hardware support is for the PDP-11/70 minicomputer under IAS. This machine, like the top of the HP, Varian (Univac), Data General Corp. and other minicomputer lines, is perhaps more accurately described as a midicomputer.

Data base interface is via the Codasyl DML in Cobol and by CALLs in Fortran, Basic and Macro-11 programs. No query facility is initially available.

DEC, not known in the past for software development, was not the first mini manufacturer to arrive at the DBMS market. Since it is the largest, however, and one of the most respected, its move into the data base field is certain to have significant impact.

DBMS-11 is the first Codasyl mini DBMS (another has since been released by Prime Computers) and thus represents an important test of the Codasyl specifications in the mini environment. The Codasyl specifications envision a broader interpretation of network data structures than do either Image or Total.

Finally, DBMS-11 opens significant possibilities in the areas of back-end DBMS and distributed data base systems. The former is already well under development for DBMS-11; the latter represents a long-standing DEC goal.

* * *

PRIME DBMS

Prime Computers Inc. entered the mini DBMS field in early 1977 with the release of Codasyl-compliant Prime DBMS. Prime DBMS is described as consisting of five major components.

1. A DDL translator for data base description.
2. Subschema facilities for Ansi 74 Cobol and Fortran IV.
3. DML support by preprocessors in Cobol and Fortran.
4. A reentrant DML command processor.
5. An on-line, interactive facility for data base administration, including a DMCL capability.

(Continued on Page 125)

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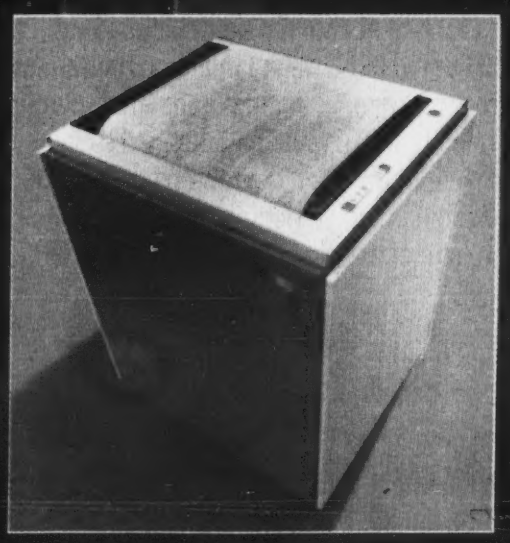

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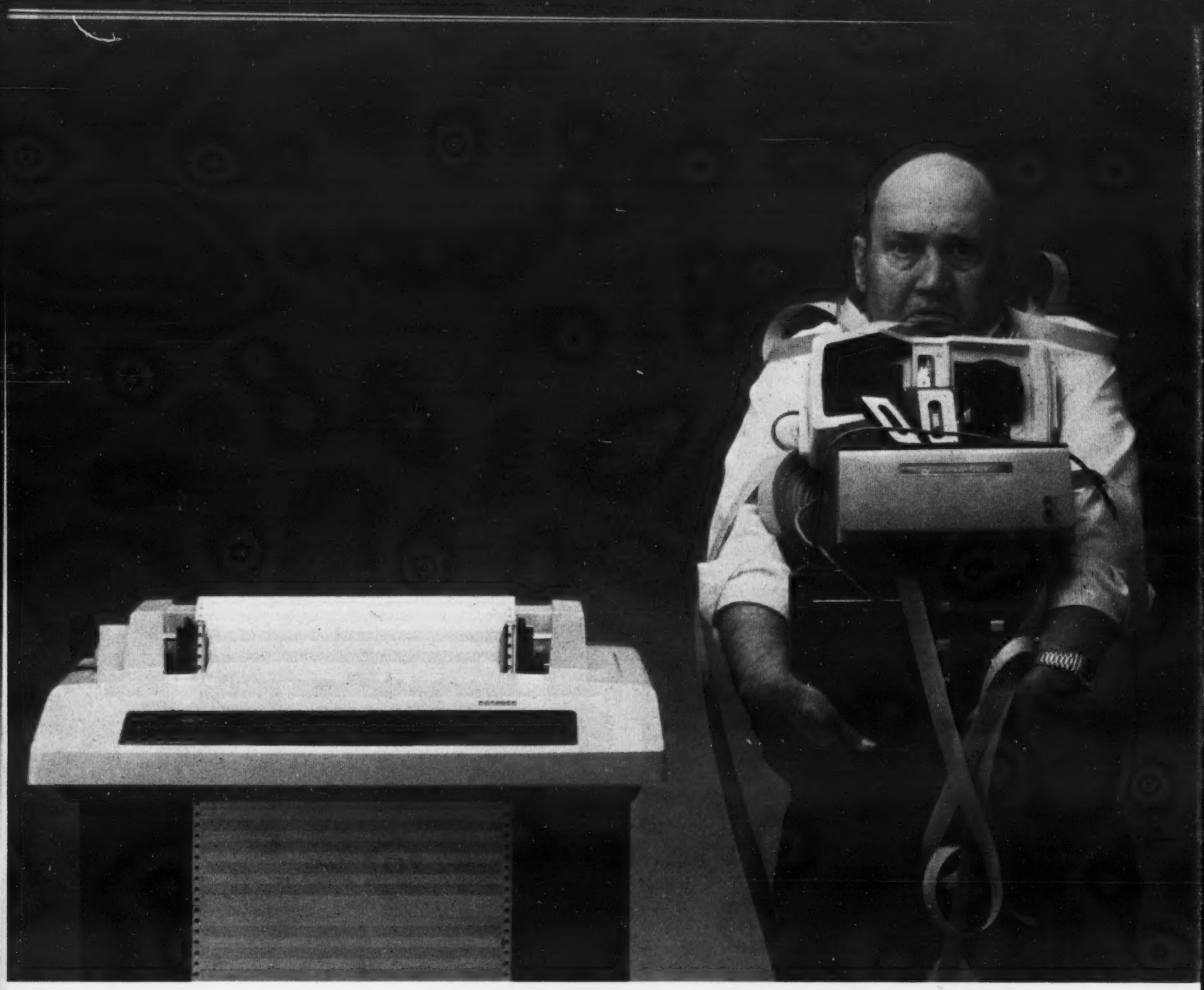

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COMPONENTS GROUP

(Continued from Page 122)

Concurrent access and recovery capabilities are supported. Size limitations are practically nonexistent; actual limitations are determined by the amount of disk storage available. Among other features, the subschema capability allows omission and redefinition of data items.

Prime DBMS runs on the Prime 400 and 500 machines, with 768K and 1M bytes respectively.

On-line transaction processing is basically supported by Prime's Forms Management System (Forms), which is compatible with the DBMS. Data base access is via Codasyl DML, supported by a precompiler in Fortran and Cobol.

An important feature of Prime DBMS is that conventional files, created by Prime's Multiple Index Data Access System (Midas), may be used directly by the DBMS. This implies the extensive use of inversion in the Prime DBMS network, although other features are also evident.

Prime Computer has brought together significant concepts in Codasyl compatibility, inverted data structures and new hardware capability in its Prime DBMS. The future of the fledgling system will be interesting to watch.

* * *

INFOS

Data General Corp., the third largest mini manufacturer after DEC and HP offers Infos, a data management facility for its Eclipse line of machines.

Infos supports three lower level access methods — sequential, random and Isam — in addition to the higher level Data Base Access Method (Dbam). Variable-length records are supported in both Isam and Dbam.

Dbam is essentialy a compatible extension of Isam in which indexing on multiple keys is supported. A Dbam index is structured by levels, which correspond to keyed levels in the indexed record. A number of structural and processing options are supported, making Dbam a powerful tool for file access.

Infos, which was released in early 1975, is supported on the Eclipse C/300 under RDOS with a maximum 256K-byte core. A new commercial processor has since been released; the C/330 with 512K bytes.

Interface to Infos is through an extended syntax in Cobol, supported directly by the Ansi-74 DG compiler or by CALLs in Fortran or Assembler.

While Infos satisfies a traditional need in mini machines for efficient record-level filing systems, it does not achieve the data independence that has come to be identified as definitive of data base systems. This deficiency is seen most clearly in the lack of separation between Infos data base creation and application program logic (that is, there is no independent DDL).

Other data base characteristics, such as data integration and subschema support, are also notably lacking.

Infos is certain to evolve (the recent release of an interfacing Idea data entry/access software package is one example) and may at some point give rise to a significant inverted DBMS capability.

* * *

ADMINS/11

The development of independent software has traditionally been relatively more important in the mini environment than on mainframe counterparts. One of the foremost examples of an independent software package is Admins/11, a data management facility from Admins, Inc. for the DEC PDP-11.

Admins/11 and Infos represent opposite extremes in the data management spectrum. Whereas Infos is essentially a powerful file access method, Admins/11 may be considered a complete data management facility. The former is oriented to the user who is capable in the technology; the latter is oriented toward the nonprogramming user, who cares little about the internal workings of the machine.

Some observers have called Admins/11 a data management "black box"; others have termed it "relational" because of its divorce of the logical from the physical.

Admins/11 runs on the DEC PDP-11 under the RSX-11D operating system. Interface with Admins/11 is through a self-contained high-level user language; a Fortran interface is also supported.

The interrelation of data in Admins/11 is largely an execution-time activity. Three basic types of data relation are featured:

- *Composite screens.* Preestablished definitions may be invoked for the on-line juxtaposition of related records, based on data values contained in the records.
- *Virtual records.* A record type may be defined that consists of data elements from separate files; the elements are aggregated when the record is accessed.
- *Relational products.* Entire files may be related on the basis of common keys (a JOIN-like operation) in order to update one or both or to create an output file.

Inversion is used extensively in support of these operations.

Admins/11, commercially released in January 1975, had its origin in a National Science Foundation-funded research project at MIT. By virtually eliminating the need for application programming and by featuring powerful "relational" operators, Admins/11 approaches new ground in data independence.

* * *

MAGNUM

Tymshare Inc.'s Magnum is one of the best examples of powerful new systems emerging from the remote-computing industry, which as a whole is increasingly emphasizing data management applications.

Magnum's approach to data handling is largely relational in nature. A Magnum data base, called a schema, consists of two basic types of declarations: field definitions and relation definitions.

A relation definition includes a list of previously defined field items, some of which may be keyed. Besides the stored relations, relations can also be defined "locally" within user-written Magnum procedures A local relation is thus one defined in terms of other relations through the operations of the Magnum language.

There are actually two Magnum languages; a command language for simpler reporting and maintenance and a data management language for more complex tasks. The syntax of the latter, which is very much like Algol, emphasizes nested logic for successive operations on local or stored relations.

Magnum, first released in mid-1975, is supported in the Decsystem-10 environment. Host language interfaces for special processing tasks are reportedly being developed.

Tymshare, which also offers a communications network, Tymnet, reports no plans for making Magnum available for in-house purchase.

Tymshare's offering of Magnum is especially oriented toward medium-size to large organizations that require on-line transaction-type systems supporting access to a central data base from multiple locations (that is, geographically dispersed organizations). Tymshare reports current support for one two-billion-character data base.

Magnum is also attractive to smaller companies (less than $50 million of sales) and to individual divisions of large organizations receiving inadequate processing support from an in-house computing facility. Potential competition with mini DBMS in these areas is evident.

Magnum has been recently enhanced to support simulataneous updating; other enhancements are being made to improve security.

Magnum is perhaps one of the best examples of the type of large-scale user-oriented data management systems now within reach of current hardware technology. It demonstrates that the commercial impact of the relational model is beginning and that the elimination of Cobol programming is feasible — even desirable — in many types of applications.

Tymshare is pursuing other areas of development as well: portions of Magnum are being integrated into a proprietary intelligent terminal, using microprocessor technology.

Tymshare's emphasis on Magnum development (Tymshare also offers System 2000 and Focus for use on its IBM hardware) is an indication of the growing importance of data management to the remote computing industry.

* * *

NOMAD

Nomad, a data management facility offered by National CSS, Inc. (NCSS), is comparable to Magnum in a number of respects. It was released in September 1975.

In a Nomad data base, items are grouped into segments, which can be hierarchically positioned into a tree structure, much as in IMS. Unlike IMS, however, segments or trees are not logically related using physical linkage; rather, a run time relational capability is supported, in some ways similar to Magnum.

Also like Magnum, Nomad emphasizes user-oriented interaction with the data base by either of two means: a high-level command language or a

(Continued on Page 126)

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IN DEPTH

(Continued from Page 125)

self-contained procedural capability for more complex processing tasks. Unlike Magnum, however, Nomad features a substantial subschema facility. Data independence to the element level is supported.

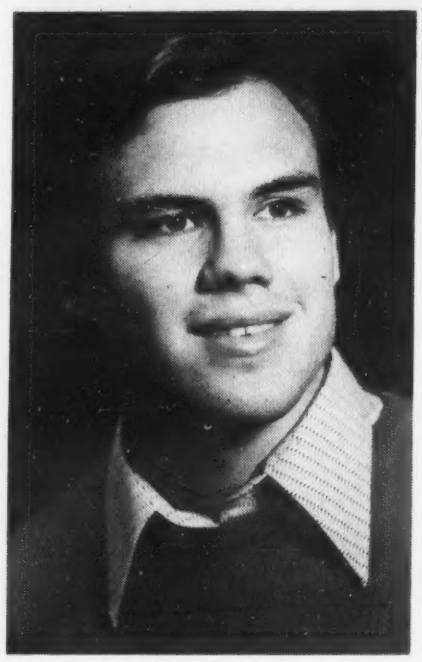
Nomad runs within the IBM 360 and 370 environments. NCSS, which also offers a communications network VP/CSS, plans to market an in-house OS/VS version in 1978.

Support is being developed for simultaneous updating and for host language interfaces. Also available from NCSS is Mathematica's Ramis.

Both Nomad and Magnum have been criticized in some quarters as dead-end systems, in which the user faces undesirable lock-in to a particular system. The counterargument is that by emphasizing high-level user-oriented languages, advances in hardware technology can be accommodated without impact on existing applications.

Overall, Magnum and Nomad are significant first experiments in large-scale commerical systems under the relational model. Although they are by no means "pure" relational systems, to many observers they are steps in the right direction.

NCSS, second in size only to Tymshare among independent remote computing companies, rates Nomad as one of its most successful products. The future of both Magnum and Nomad — and other systems of their class — is by no means assured, but these systems nonetheless constitute one of the most active sources of innovation in the data base field.



Ronald G. Ross is senior staff consultant for data base systems at Performance Development Corp. in Princeton, N.J. He is the author of many articles and monographs on topics that range from data base administration to trends in data base management systems packages. Typical are "DBMS," An Overview of Data Base Technology from Government Data Systems *and "The Data Base Administrator: What Is His Place?" from the* Journal of Systems Management.

Ross, who is 27, graduated from Rice University with honors and holds an M.S. degree from the Illinois Institute of Technology.

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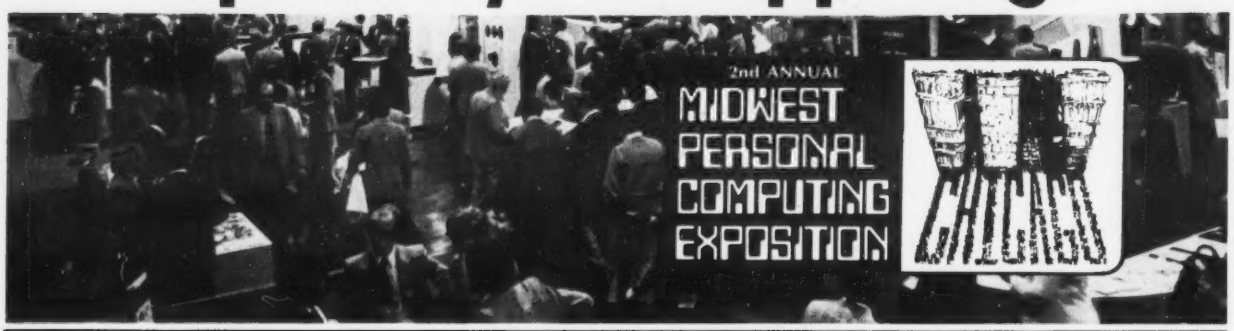

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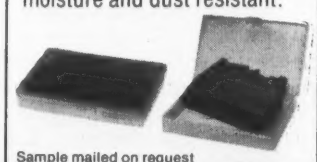

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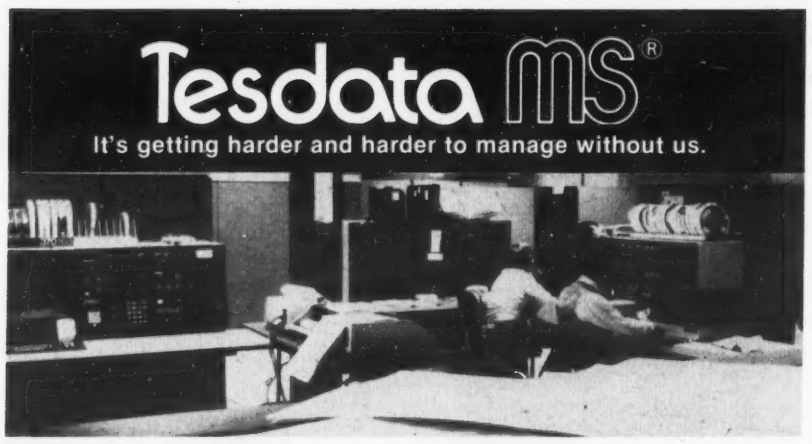

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SAN DIEGO — One of the best buys in computer output microfilm (COM) recorders today is used, previous-generation equipment. And if this equipment is still being manufactured, it's an even better buy, according to Gil Abernathy, manager of technical support for Datagraphix, Inc.

Abernathy, who has maintained four generations of COM equipment for Datagraphix, noted in a recent interview here that used, previous-generation equipment is generally available for delivery in the same 30- to 60-day period as its later counterparts, produces output of the same quality and speed as when new and is priced at about a 25% to 40% discount.

But, he cautioned, not all used recorders are wise investments. Abernathy classifies used COM equipment into three life cycle categories for prospective buyers.

"I can safely recommend that a used but currently manufactured recorder is a smart buy as long as its specifications satisfy the needs of the user. When a recorder is two to four years old, the components should still be in good operating condition and provide reliable service," he suggested.

Although used state-of-the-art recorders are rarely available, previous-generation recorders still being manufactured are frequently available in the marketplace at great savings.

The second category of equipment, Abernathy said, should be approached with a degree of wariness: "Generally, I would not suggest purchasing a machine more than six or seven years old. Although the performance will be up to original specificaitons, users can expect more downtime. As with all other electromechanical devices, components tend to deteriorate with age."

Model 4360 an Exception

One exception, he claimed, is his firm's Model 4360. "More than 100 Model 4360s are still in use six to 11 years after being manufactured. They don't seem to be affected by age and have proved to be very reliable.

"I would have to consider the 4360's to be an exceptional buy for users without requirements for a minicomputer, integral film processing or the newer convenience features," he added.

The third category, according to Abernathy, should be avoided by all but the most experienced COM users. "I would discourage the purchase of recorders whose manufacturers are either out of business or who have stopped servicing the equipment. The users often experience great difficulty in obtaining software support, service or replacement parts, which may have to be custom-made," he said.

As in selecting new equipment, the purchase of a used machine is predicated on its capabilities, Abernathy said. The used unit must meet user needs for film widths, tape formatting, speed and archival quality.

(Continued on Page 130)

Qantas DP Upgrade Risks Koala's Wrath

SYDNEY, Australia — The koala bear that hates Qantas Airlines for flying more and more people to Australia is going to be even more upset. The air carrier is upgrading its DP capabilities, enhancing its passenger and cargo operations and enabling the airline to bring even more people into the koala's homeland.

To keep pace with service to 28 countries and some 1.5 million annual passengers, the DP upgrade now underway involves not only the mainframe, but a host of data storage and communications equipment as well.

Qantas is more than quadrupling the storage capacity of its disk subsystem. This is being achieved with the installation of a Memorex Corp. 3650 disk storage subsystem consisting of 20 spindles with 317.5 M-byte capacities plus four spindles of Memorex 3640 drives with 70M byte replaceable parts. The overall capacity for data base storage is 6.63G bytes.

The spindles will be attached to two Amdahl Corp. 470V/5 CPUs operating under IBM's MVS, which are replacing an IBM 360/65 multiprocessor with an MVT operating system.

"This equipment and operating system upgrade will allow us to cope with an expanding DP function," according to John Colwell, computer planning manager for Qantas. "We are adding a number of on-line applications that have previously been done in batch mode."

The on-line system will provide instant access to inventory status of about a quarter million different part line items valued at $70 million. This inventory is required to support a fleet of 15 Boeing 747s and four Boeing 707s. Qantas is also adding two 747s annually as passenger and cargo volumes grow.

The on-line inventory system now being developed by Qantas will permit more accurate tracking to assure the availability of spare parts throughout the 28 countries served by the airline, Colwell said. It will also be used by the Supplies and Procurement Division, as well as the engineering overhaul staff.

Called "Superquic", the system will produce all purchase orders and receiving documents.

"On-line inventory will mean instant stores inquiry. The data base will be more current, and we expect to reduce significantly the time required to get a part from stores to the engineer.

"Also, the system will indicate the availability of parts in repair status and those newly received," Colwell explained.

Pacer is the acronym for Planning and Control of Engineering Resources," a separate inventory system for serial-numbered components. This file contains the air-worthiness records and can be used to trace the reliability effects of engineering changes.

"The IBM 3350-type storage devices were selected because, in our opinion, they are the best performing disks for use in an IMS on-line environment. In our

(Continued on Page 130)

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Qantas Upgrade Risks Increasing Koala's Wrath

(Continued from Page 129)

applications we have need for few replaceable disk packs, Colwell noted.

"This need is satisfied by Memorex 3640 devices and some older 3330-type devices previously used on the IBM 360/65 multiprocessor. Memorex was chosen to supply the drives and controllers because its equipment offered the best price/performance characteristics among the vendors we examined," he added.

Optional Fixed-Head Feature

Also part of the DP changes is the elimination of a 4M-byte IBM 2301 drum memory. The optional fixed-head feature of the Memorex 3650 drives will be used instead to provide 1.14M-byte/spindle with zero seek time.

As a result, more than 22M-bytes of memory will be available for paging purposes and for storing operating system data sets that are heavily used.

The 3650 drives, six of which have already been delivered, and the 3640 drives already installed will be configured in four switchable strings, two with six spindles each and two with four spindles each. A four-channel switchable Memorex 3674 storage control unit will interface each string to the mainframe channels.

The Amdahl systems, like their predecessors, will be used primarily for general DP, including financial, accounting, payroll, parts inventory and market analysis applications. The Qantas facility also includes two other dual-processor CPUs — two IBM 360/65s used for airline reservations, departure information and ticketing systems and two 360/40s, which perform flight planning and on-line engineering applications.

Qantas' reservations system permits users instant access to the data base from Qantas ticket offices, airports and selected Australian travel agents. It indicates seat availability, allows for bookings, handles requests for special services and confirms bookings for Qantas flights in seconds.

Reservations for flights with other carriers are also handled through the system, which links automatically to other airline computers via worldwide, cooperative networks.

Satellite Circuits

Each of the mainframes is accessible via leased satellite circuits from 1,200 on-line remote terminals in 40 cities throughout the world, plus 200 terminals in Australia. Six Honeywell Information Systems, Inc. minicomputers (plans call for replacing these with two triple-processor Interdata 8/32s) perform the front-end message-switching and communications task.

Two Memorex 1270 terminal controlelrs handle transmissions to and from the 360/40s; two Memorex 1380 programmable controllers are to be added to do a similar job for the reservations system.

Eighteeen Memorex 1377 CRTs tied to the Amdahl systems will be used locally for program development.

The Computer Planning Department, which Colwell heads, consists of a staff of eight. Of these, three are engaged in equipment planning.

The department also includes the Computer Installation Section, the Systems Planning Section and a project coordinator for the major upgrade that is now in progress.

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Used COM Units Good Buy

(Continued from Page 129)

Unlike the purchase of new equipment, however, the final decision should include consideration of a few disadvantages inherent in used equipment. For example, customers may not have the option of upgrading as their work volume or needs increase.

Older equipment may not give the same output quality as the newer models. The latest generation of equipment features higher film resolution and brighter CRT tubes, resulting in greater reliability for end users, Abernathy pointed out.

For new in-house COM users, software availability is a must and should be specified in the contract, he added.

Refurbished or 'As Is'?

At times, prospective buyers are offered a choice of acquiring factory-refurbished or "As Is" equipment. If the "as is" unit has consistently been maintained on a preventive basis by the manufacturer and the service contract is to be continued, there is little risk in taking advantage of the additional savings that can be realized over a refurbished model, Abernathy said.

Users can expect an installation charge on "as is" equipment to be added to the purchase price, but included with refurbished or new equipment.

Abernathy emphasized that as equipment ages, the desirability of service contracts increases. He added, however, that many users have maintained their own equipment for years.

Although Abernathy was not aware of any long-term service contracts, he said Datagraphix and other vendors have continued to renew contracts on their equipment on a year-to-year basis. Unlike CPU service contract rates, which often increase incrementally with the machine's age, service prices for COM recorders are usually consistent for all like models.

When comparing the total costs of used with new equipment, users should consider the impact of foregoing the flat 10% investment tax credit allowed to companies on new equipment, Abernathy suggested. The tax credit base on used equipment is limited to $100,000 until 1981 and $50,000 after that.

Abernathy feels the purchase of used COM equipment, particulary currently manufactured models, is often a sensible buy. For machines older than six or seven years, the disadvantages must be closely weighed against the advantages of a low initial purchase price.

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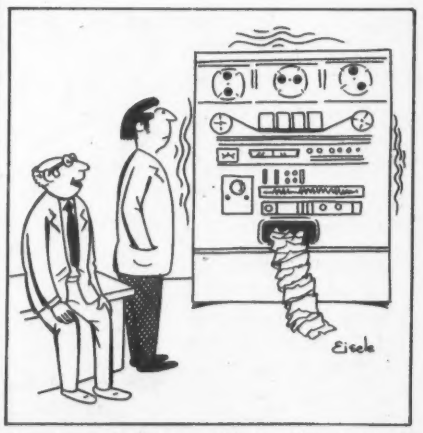


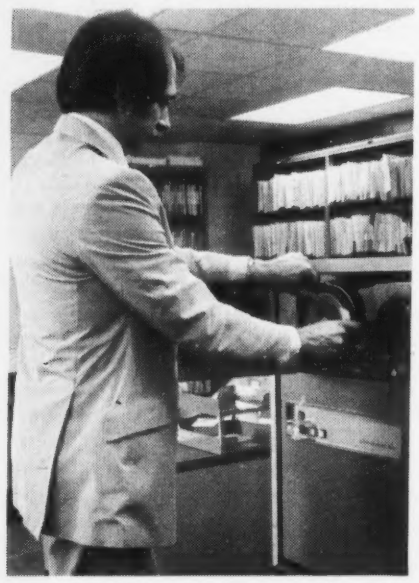
'It's Impossible to Work With It Until It Has Had Its Morning Cup of Oil.'

Saves $20,000 First Year

Key-to-Disk Dishes Up Food Institute Benefits

CHICAGO — Improved member service, more complete information, better management control and a cost reduction of $20,000 are the major benefits that have reportedly resulted from the installation of a key-to-disk data entry system at the Institute of Food Technologists (IFT) here.

IFT is a worldwide professional society for food technologists, food scientists, engineers, executives and educators in food technology or related fields. The society publishes a monthly paid magazine, *Food Technology*, and a bimonthly publication, the *Journal of Food Science*, for its 17,000 members.



Records at IFT are now upated on the day they are received, rather than in the eight to 12 weeks needed by its former service bureau.

Previously, IFT handled DP and data entry through two outside service bureaus. One of the service agencies punched cards; the other performed the DP. Only a keypunch was kept inhouse for corrections.

The cost of these services was reasonable, but growth placed a real pressure upon IFT. Lacking control, IFT had to conform to existing circulation/-membership and other programs, making it difficult to obtain, for example, more than basic data required for audit of its paid publication by the Audit Bureau of Circulation (ABC), a spokesman explained.

Turnaround was slow, causing delays in circulation/membership operations. Activity had to be cut off during the first part of the month, for example, yet IFT received no resultant output until the end of the month.

Members were requested to provide eight to 12 weeks advance notice for address change, with no assurance that the change would even be made within that time, the spokesman said.

Punched card processing resulted in errors and loss of cards; member dues and subscription payments had to be accounted manually since no programs were available to meet its specific needs on the service bureau systems.

IFT investigated the capabilities of other service bureaus to handle its needs, but found them too far away or demanding $50,000 for tailoring or creating programs.

It was at this time that Univac announced a data base management system for its 1900 key-to-disk system and a management consulting firm pointed out that the unit's capabilities would meet the society's needs. IFT decided to go with the system, and development and training began in early 1977. The system was implemented last August; it now processes all IFT applications, including cash management.

John Lane, IFT director of membership, received a short course in 1900 programming and now also serves as DP director. He supervises a staff consisting of a programmer, three operators, an accounting clerk and a secretary.

"We are now able to provide faster and more accurate service to members," Lane said. "For example, we now update member and subscriber records on a day-received basis vs. an eight- to 12-week turnaround time.

Data Entry Dimensions

"Accuracy is improved because there are much better checks built into the programming and more data is automatically generated, reducing the potential for error," he added.

Reports and analyses are now produced in more complete detail, specifically tailored to meet IFT's informational needs, Lane noted, and "cash management operations are completely automated, eliminating manual accounting.

"Management control is better because all the processing is now inhouse" he pointed out. "There is nothing we can't do through internal programming."

$20,000 Savings

Lane also stated that the system is saving the society approximately $20,000 during the first year. "Equipment rental is the same as the charges

(Continued on Page 134)

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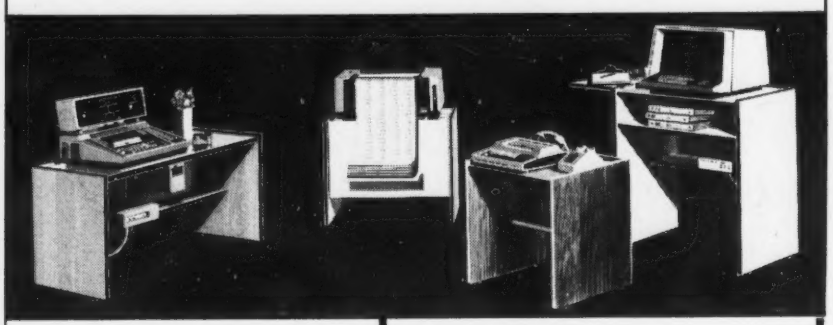

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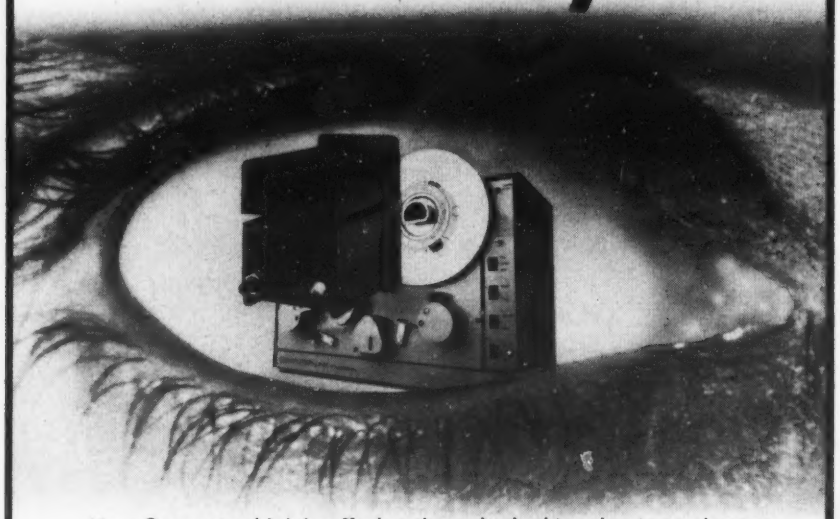

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'Pacers' Helps Indiana

INDIANAPOLIS — A police detective here became suspicious not long ago of a homeowner who reported a burglary. The detective used the resources of a medium-scale, virtual storage mainframe to "shop around" a little.

The detective discovered no other homes in the area had been burglarized recently — although the homeowner had reported several burglaries. Further investigation showed the reports were ficticious, made to collect on insurance policies, according to a police spokesman.

"In a manual system, the detective probably wouldn't have found this out because he wouldn't have had time to do the required clerical work," Chief Eugene Gallagher said. "But our Police Automated Case Entry and Retrieval System [Pacers], which operates on an IBM 370/145, provides accurate information, immediately, cross-indexed, in almost any form.

"And it provides it to the investigator, to the officer on patrol (through the dispatcher) and to management," he added.

"For example, the value to management is incalculable," Gallagher continued. "From the Pacers data, the CPU automatically produces reports and analyses of many kinds, periodically or on request. It analyzes crimes by type, pinpointing where each occurred, down to the individual block if we want.

"It shows radio runs, manpower resource allocation traffic-ticket density, trends and the like. In fact, for virtually everything of an administrative nature, we go to the computer and retrieve exact data on which to base decisions without guessing," the police chief said.

"Recently, we could see that car larcenies were increasing in one section of the city," he explained. "But before committing more manpower, we asked for an additional computer report pinpointing the location of the larcenies. It showed they were occurring primarily in three major parking areas, at specific times. So we were better able to decide how many officers to use, uniformed or plainclothes, and the hours they were to work.

"Similarly, we needed statistics on the number of vehicles towed and the points to and from. The system produced this for us, by month, so we could also see the seasonal aspects. This enables us to give citizens better service regarding the storage of towed vehicles."

"No computer can solve a case — you've got to get out on the street, make contacts and work your tail off," Jack L. Cottey, deputy chief of investigations, pointed out. "But Pacers more than doubles the time a detective can spend on the street because it eliminates a lot of paperwork and speeds information retrieval. He's on the street by 11 a.m., instead of about 2 p.m., and he has better information than he ever had before.

"Consequently, we're giving improved service to the public. And we have better public relations, too, because we're more on top of each case and can determine where it stands if a citizen calls."

"Quick information is increasingly vital for the officer on patrol, too," Gallagher said, "because the courts are taking a dim view of detaining suspects for excessive time. In the past, an officer had to detain a man for 10 to 15 minutes just to check local wanted data. And out-of-state checks often weren't done because they were too slow.

"Now the officer asks for information and the dispatcher makes one inquiry via a terminal. Pacers checks our files, then designs an inquiry for the Indiana Data Acquisition and Communications System [Idacs] and the FBI's National Crime Information Center [NCIC] system. We get the response in seconds.

"It's interesting how street officers both depend on the system and take it for granted today," the chief noted. "We've watched them react to computer systems over the years. And that reaction has gone from a tolerance for 15-minute replies to local inquiries to, now, impatience if it takes more than five seconds to make a national check.

"The complaints we hear if the system goes down show how much the officers depend on it," he added.

400 Daily Reports

The Indianapolis Police Department is responsible for a district covering 90 square miles with more than 500,000 people. It includes 1,125 sworn officers and 204 civilian personnel.

Reports from patrol officers are keyed into the system in an interactive mode.

Police Stamp More of Its Records 'Case Closed'

The City of Indianapolis and surrounding Marion County share a unified government which serves a population of about 800,000. The remaining 310 square miles of the county are patrolled by other municipal police forces and by the 350-man force of the Marion County Sheriff's Department, which also manages the Marion County Jail.

"Currently, we have 64 CRT stations and 14 printers, most of which are used by Pacers for input or retrieval," Lt. Darrell J. Bumen, DP manager, said. "Nearly 400 case reports are keyed in daily, including both originals and supplementals.

"Inquiries average more than 5,000 a day, and come from Dispatch, Central Records and Identification, the Auto Desk, detectives, the Pawn Detail, fire department, airport police, county sheriff, garage, jail, Juvenile, Property Room and Fleet Maintenance, all of which are tied in."

With Pacers, an officer phones in his incident report in a specific sequence to a message recorder beside a CRT operator. The operator plays back the dictation and keys it into the computer in an interactive mode.

As he enters the data, the 370/145 creates three basic files: people — officers, witnesses, suspects, for example; property — of all identifiable items; and vehicles.

The system also automatically compiles numerous cross-indexes for subsequent inquiry and statistical reporting. And it checks each address against stored data on city blocks to make sure the address is valid, then automatically attaches proper coordinates.

The system decides, too, which departments should receive hard copies of the report, based on its content, and transmits the data to printers in those departments automatically and immediately. Some reports go to all departments, some to just a few.

Instant Retrieval

The stored data can be retrieved immediately. The officer on the street, through the dispatcher, has access to information on wanted and missing persons, stolen automobiles and property, histories of incidents at various addresses, motor vehicle and drivers' licenses, statewide wants and stolens and NCIC information.

Investigations Division personnel have access to all the information available to patrolmen and also to data on persons and vehicles mentioned in reports — the witnesses, complainants and physicians, for example.

Before 1970, incident reports were typed from handwritten data in a central teletypewriter facility and transmitted to nine stations within police headquarters. Seven persons coded data from the reports for statistical and management analysis, and up to 12 people in central records typed and maintained at least three 5 by 7 cross-reference cards for each report — on type of incident, location, names of persons involved, and so forth. Homocide, juvenile, traffic accident records and other divisions also kept cross-reference cards.

This approach posed its problems: Central records was not manned on nights and Sundays; creation of the cards fell more than three months behind case reporting; misspellings and different versions of names complicated retrieval; entry of statistical information required keypunching.

"In those days, our investigators had to walk back to a cross-index card file," Cottey said. "Sometimes the data was misfiled, and sometimes they found 10 guys with the same name. But now they can get the information in a few seconds from any of several nearby terminals. It's never out-of-file and it's much more accurate.

"Also, input of information is much more efficient. Some detectives formerly typed their case reports. They weren't supposed to, but if they used the old central dictation system, sometimes the reports didn't get typed and returned for five or six days.

"Now the information they dictate is available immediately by terminal and a 'Detective Supplement Copy' starts coming off a printer within seconds. Each supplement lists action regarding a case since the original incident report made by the uniformed officer."

On-Line for One Month

The full text of each incident report and detective supplement is kept on-line in the system's disks for one month. Then microfiche of the report is filed in the central records room. However, the index entries are kept on-line for 18 months or until the case is closed, whichever is longer.

Pacers' data therefore occupies an average of 400 million characters of disk storage. The 370/145, installed in March 1973, has a 1.5M-byte main memory and a total of 2.8 billion characters on-line in eight 3330 disks and four 3350 disks.

"Our police 370/145 is located in the Marion County Central DP Installation," Bumen said. "Central DP also has a second 370/145 for administrative purposes. All I/O devices can be switched between the two systems. And OS/VS1 enables police and administrative on-line jobs to run simultaneously on either computer."

Other police applications include an on-line traffic violations bureau system for parking ticket citations and other traffic activity; computer-assisted dispatching; a summons system for moving violations and an accident system by types and location of traffic accidents.

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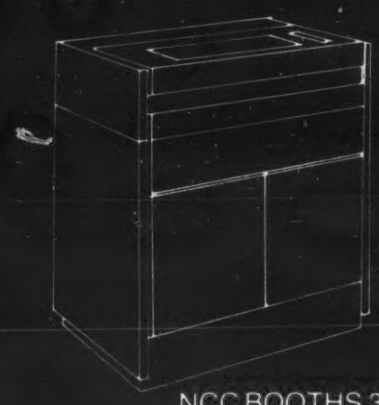

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System Serves Several Benefits to Food Group

(Continued from Page 131)
were for outside service bureau processing and the keypunch rental. However, we have reduced clerical time equivalent to one full-time person, making it possible to reassign one of our people to other duties.

"Furthermore, reduction in turnaround time for recording updates has cut the need to send out back issues, giving another substantial savings — about half our professional and student subscribers change addresses every year.

"Overall, we can now do two to three times the processing that could be done previously. We are achieving this increased capability with a first-year savings of $20,000, using a system costing much, much less than what a basic computer would cost, to do the same processing work."

According to Lane, the 1900 system currently consists of 112K bytes of memory, a 17.6M-byte disk, a phase-encoded 800 bit/in. tape drive, 200 line/min printer and three keystations. Daily production includes entry of member subscriptions and cash data against the Cobol program's real-time validation and balancing.

All files are updated during key entry, providing a full transaction-processing level of error detection.

Additions, deletions, changes and reinstatements are processed on a real-time basis, maintaining all files on-line. Inquiries are met with completely updated information, an important feature when 10 to 20 phone calls and as many letters are received each day, Lane noted.

IFT produces more complete monthly circulation membership reports, used to generate the semiannual ABC statements and management information. Going far beyond the ABC requirements, reports provide analyses in terms of renewals, renewal percentages, business classifications and other criteria, he said.

The *World Directory and Guide*, logs of section and division members, membership cards and invoices are also more accurate and efficient, Lane said. Member records are now designed specifically for IFT needs rather than existing program requirements, making it possible to select any time in the record for survey purposes.

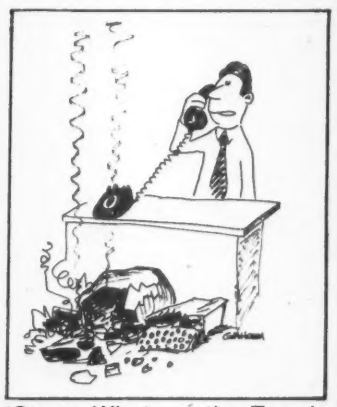
Future Plans

In the future, IFT plans to process expense analyses on the system, producing a weekly rather than monthly report. Further accounting functions will be added to provide even better control and accuracy, freeing up a bookkeeper for other duties, Lane said.

Another added application will be registration for the annual IFT convention and exposition, normally attended by 9,000 to 10,000 persons. This involves processing the registrations and hotel assignments, producing a daily listing of attendees by business classification for use by exhibitors through a terminal installed at the convention site. The 1900 system will process the data and produce printed output.

To handle these and other future applications, IFT plans to add 16K bytes of main memory and another 17.6M-byte disk, as well as replace the 200 line/min printer with a 600 line/min device. A fourth keystation, exclusively for system management, will also be added.

"We anticipate that we will be able to reduce our staff even further and reassign people to other duties as we continue to expand DP applications," Lane said. "Basically, we now have control over our own destiny, making it possible to grow and change in the future without a proportional increase in cost."



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Revised to Suit On-Line System

Admitting Form Keeps Hospital's Users Happy

By Robert Brown
And Fred J. Lucky
Special to CW

MERRIAM, Kan. — When we brought in our on-line data communications and processing equipment and programs at Shawnee Mission Medical Center, it also became necessary to revamp our paperwork systems. Since the admitting form is the key to all subsequent recordkeeping in a hospital, that's where we started.

We have developed an admitting form that meets all our objectives — compatibility with the equipment, coping with the demands of personnel and departments and answering the basic information needs of the hospital. Designing this form was a cooperative effort between medical center personnel and a Standard Register Co. representative.

We "walked through" the system, talking to everyone who received or used a copy of the form for whatever purpose. This enabled us to determine the information needed and which copies should have the highest priorities.

Shawnee Mission Medical center was started about 16 years ago as a health center and extended care facility. Shortly thereafter, it began a gradual transition into a complete hospital, owned and operated by the Seventh Day Adventist Church.

Before a recent expansion, it had been using a manual admitting system including preadmission techniques in use since 1969. This method, acceptable under then existing circumstances, required typing a four-part unit set form containing a duplicating master.

From the master, we ran off 17 copies for laboratory, radiology, switchboard, social services, dietary and other purposes.

The other three copies of the form were for the chart, the business office and the insurance company.

The paper volume and lack of technical sophistication eventually made this system too cumbersome and slow for efficient use. In addition, the duplicating equipment was noisy and messy, and copies were not as clear as the center wanted.

Almost the same number of copies were needed in the new form, but it had to be printed in one run on a terminal receiving information from the central computer. Data is input to the computer at CRT units in the admitting office and in the emergency room. The form's design and construction assumed great importance since the printer has a limitation on the number of copies it can produce legibly.

Limited to Four-Part Form

Following discussions with the people who would be involved with the form, we determined that 16 copies were needed.

Print impact limitations of the terminals, however, limited us to a four-part form for necessary copy legibility. The solution was to design the form so that each part divided into four sections separable along perforations.

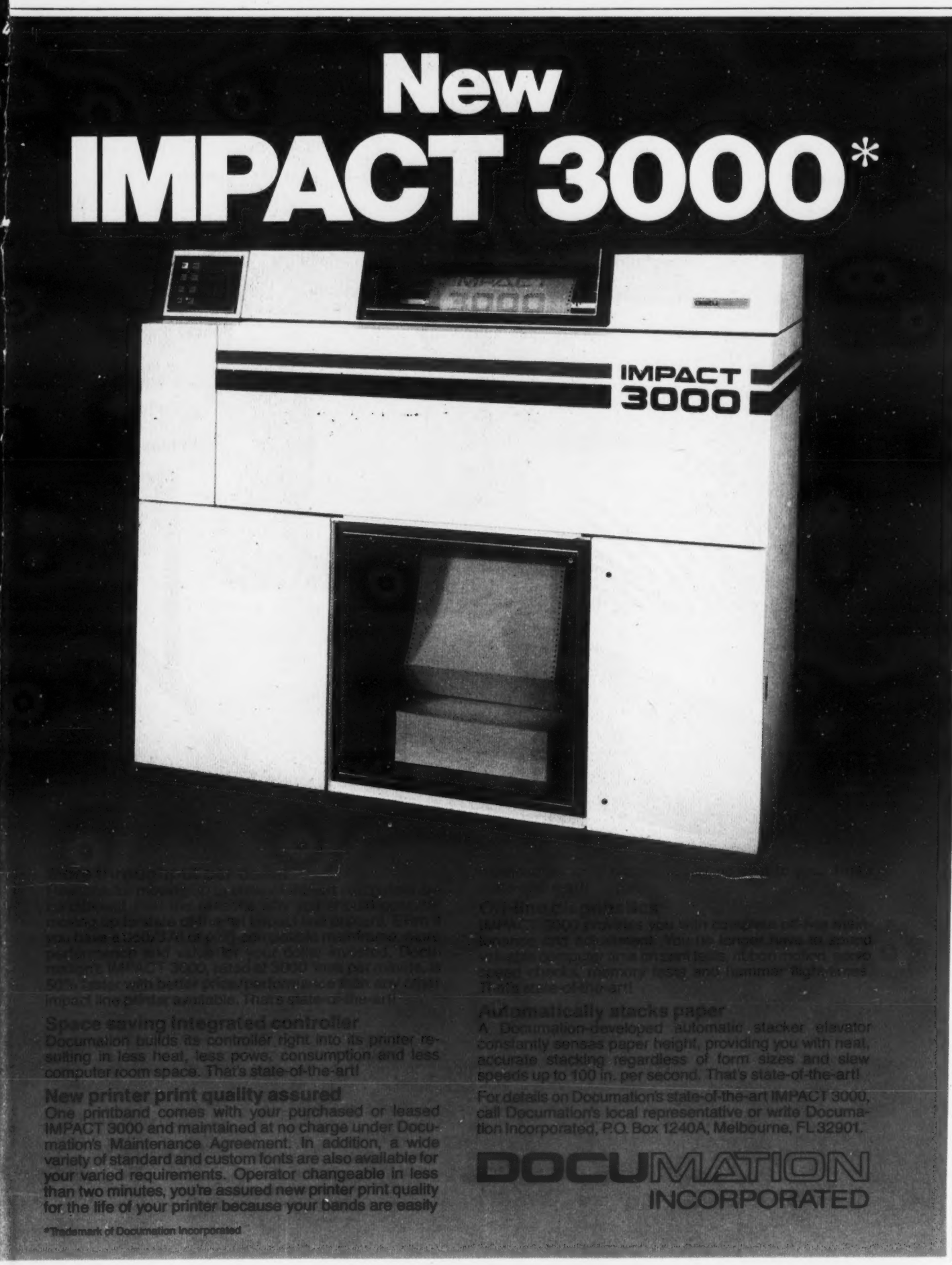
Designing such a form proved to be an exercise of considerable creativity and ingenuity. The result was a four-part, 32-in. long document for regular admissions and a five-part, 17-in. version with a pocket section made by the last two copies for emergency room and out-patient use.

All are printed on chemical carbonless papers. And just in case the equipment is ever down, we are covered with a two-part "Zipset" version for immediate needs.

Each of the four parts of the basic admission form breaks down into four sections from top to bottom, alternating an 11-in. section with a 5-in. section. Entry of basic patient information, from number to doctor name, requires the whole of the 5-in. length copies and the top halves of the longer copies. This data is printed four times so it appears on 16 copies.

The top part of the form provides copies for the chart, pa-

(Continued on Page 136)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Admitting Form Suits Range of Hospital Needs

(Continued from Page 135)
tient reservations department, business office — counselor and medical records department, the first and third being the 11-in. sections.

The bottom half of the chart copy has space for the entry of physicians' notes concerning diagnoses and related information; the bottom half of the business office-counselor copy has space for the entry of insurance and benefits information. The back of the chart copy is used for the "Authorization for and Consent to Surgery or Special Diagnostic or Therapeutic Procedures."

The form's second part has copies for business office-surety information, the consulting physician, a second consulting physician and the development and communications department, which is basically public and patient relations.

The 11-in. business office copy now has preprinted financial terms in place of the physicians notes on the bottom half, but the insurance information at the bottom of the second 11-in. section remains the same. And from this point on, all copies have the same layout.

Part three has copies for the business office-insurance, the anesthesiologist, the attending physician and the infection control nurse. In the last part are copies for the patient, the dietician and the social services and radiology departments. The last name is used for that department's billing purposes since it is separate from the hospital.

Terminal Printer Specs

The specifications of the terminal printer played a role in determining the final construction of this form. Because there must be a fairly deep allowance for form lead-in, the last section of the form is 5 in. long and the four copies involved are not needed immediately.

Thus, when patient information printing is completed, we remove the last part of the previous document along with the first three parts of the present one. This prevents any forms waste. The form removed is separated and copies are distributed immediately as needed.

The 17-in. long emergency room version has its own format, following in part that of the basic admission form, but differing where necessary to meet requirements. Its five parts divide into two sections each — one 11 in. long and the other five in. long.

The additional inch is a top stub so that after removal from the printer the parts will hold together as needed. Information entry and resultant printout are the same through CRT and terminal.

The top part gives us a copy for the medical records and patient reservations departments; part two covers the emergency room copy and one for the radiologist; part three includes a file copy and an extra copy and part four provides the same.

This last file copy, however, combines with part five to form a pocket to hold documents relating to out-patient charges. The back of the pocket, part five, is printed for the entry of data relative to out-patient charges.

The back of part one is also used to carry information concerning the authorization for medical and/or surgical treatment and for surety arrangements, both requiring signatures.

The top half of the top copy of the emergency room version carries the basic patient information while the lower half is used for the entry of physicians' notes concerning diagnosis, treatment, history and physical and nurses' notes. Should a patient need to be admitted, then the important information is already in the computer files and we can request a printout of the regular admission form when needed.

We have covered ourselves in case of breakdown by designing a two-part "Zipset" admission document.

The hospital is currently using an NCR Corp. Model 8550 for its DP needs. It is also using model 646 and 6440 printers as well as NCR data entry terminals.

Brown is the director of patient services and Lucky is the assistant director for the Shawnee Mission Medical Center.

With Real-Time System

Air Carrier Moves Freight Without Paper

Special to CW

TULSA, Okla. — To meet the competition head-on, American Airlines is dealing with the federal decontrol of cargo in the best way it knows how: by maximizing the profitability of its present resources — mainly its three 747 and nine 707 all-freight airplane carriers.

With 20% of a domestic market of more than $1 billion a year, — American is turning to the task through more effective use of its real-time, computer-based, freight-carrying system. Called Semi-Automated Business Research Environment (Sabre), the system is serving two purposes: It is helping to track containers from shipping point to destination and it is providing profitability analysis on every trip segment flown by the airline.

"We are within a hair's breadth of being a total information system," according to George A. Shipman, American's senior director of freight market plans and administration. "We started out with a system that enabled us to effectively handle freight physically and ended up with one that tells how profitably it was done."

Big Job for CPU

Every plane that flies, whether designated passenger or freight, carries some freight. With 1,000 flights a day connecting 59 different cities, and about 4,000 containers holding 40,000 shipments moving around from place to place, the CPU has a tremendous task, Shipman noted.

Not only must it be able to immediately tell the company where every container is, it must indicate the type: The right container must be in the right city when the customer needs it, or a sale can be lost. With Sabre and its IBM 370/-168 linked to a national network of some 200 remote entry terminals, American tracks each container by serial number.

It then extracts from the computer a summary report which will specify the number of each type of container which is available in selected cities. This is all accomplished without a single piece of paper going with any shipment — "We let the computer 'ship' the paperwork," J.J. O'Neill, vice-president for DP and communications services, pointed out.

But it wasn't always so simple. In the early '60s, all cargo was controlled by individual shipment. Every time a shipment was sent or received, a card was filled out with the airway bill number and other data and the card was filed — to be constantly referred to and updated manually.

A network of telephones connected city to city. As the number of shipments increased, however, the job of keeping the cards current and accurate became impossible.

In 1968, American initiated the concept of keeping track of containers with many different shipments instead of trying to follow, via paperwork, every individual shipment. Progress began with an extremely small data base that enabled the company to create an airbill and transmit it from San Francisco to Dallas.

American went on to build a system designed to mature along with the advancing capabilities of developing hardware. "We did not try to turn on the world at once," Ted Tower, director of freight operations, recalled.

The principle is simple, Tower said. After a shipment is put into a container, a note

(Continued on Page 138)

If your business depends on the flow of information between locations, TI's new Series 700 Distributed Processing Systems can lower your costs and increase your profitability.

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Standby UPS Offers 24 Vdc

AUSTIN, Tex. — Austron, Inc. has introduced a standby power supply designed for use where power must be maintained in the event of extended ac power failure.

The Model 1290A uninterruptible power supply (UPS) is said to provide 24 Vdc at a maximum current of 3A and to have a total capacity of 19 ampere hours with fully charged batteries. The UPS can be configured in parallel with other Model 1290As to provide greater amperage, according to a spokesman.

Although the device can be used anywhere a UPS is required, the spokesman suggested it would be particularly well suited to applications involving frequency control and reference, such as time domain or time division multiplexing functions.

Features of the device include ac interrupt, 10A alarm relay contact, front-panel voltmeter and ammeter and internal batteries of the sealed-cell type, which require no periodic maintenance, the spokesman said.

The units are designed for use with 115V or 230V, 50- to 400 Hz operation.

The Model 1290A sells for $1,850 from the company at 1915 Kramer Lane, Austin, Texas 78758.

Airline Moves No Paper

(Continued from Page 137)

is made on the source document given to the airline by the customer to indicate the container number, the number of pieces and the name of the person who loaded it.

The source document flows to data input, where all the information about the shipment — including the name of the shipper, destination, type of pieces, weight, kind of commodity and special instructions — is captured. Then the container number is identified and batch-filed in the CPU.

As soon as the flight leaves, the record is updated to show that the container is enroute. The CPU takes the flight number and matches it to all the shipments in that container. Thus, any American customer can call any city in the country and find out where his shipment is at any time.

Information Display

After assembling all the data for every shipment on a particular flight, the computer automatically produces the records for everything on that flight. The information is at the destination before the airplane has arrived.

People at the destination airport can see, on hard copy, what is going to be on the plane, what special equipment may be needed to offload it and what must be done with each of the shipments. On some shipments, the customer may have to be notified; if a shipment requires special delivery, a truck can be there.

Most important, manpower and equipment can be matched for what is arriving on each plane, Tower noted.

After containers have been offloaded, the freight is removed and checked against the printout to verify that the goods are on hand. The freight handler can then use the same document to determine which containers should be broken down first and how the shipments should be sorted: to delivery areas for truck pickup or for storage until some later time.

Accounting Functions

Beginning in 1976, all data was captured at a central site because it was no longer necessary to have an accounting office in every city.

The pickup or delivery of the consignment triggers accounting activity at the central computing site. The design of the waybill lets it serve as the invoice to the customer.

The airline's assistant controller, John Weber, said, "we do not have to look at paper for every transaction. We bill from computer-generated records, eliminating the redundancy of key entry.

"We've sped up our billing process because we can go directly from computer output to tape without having to massage it again," he added.

The airline's top management stressed that the ability to avoid moving paper eliminates the probability of lost data. Wherever a piece of paper starts, it stops.

According to Fred H. McCusker, vice-president of freight marketing: "We can provide to the customer accurate billing and accurate and timely information on dispatch and destination of the customer's products."

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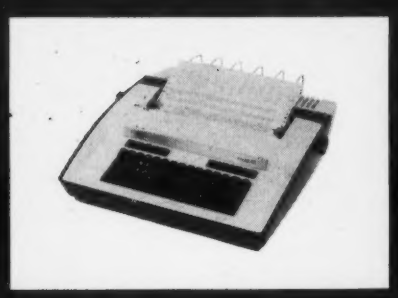

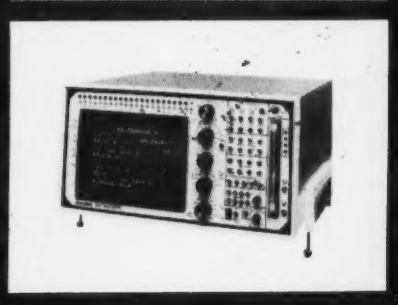

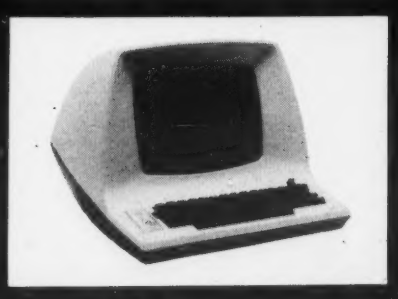

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MINI-MICRO SYSTEMS

Line's Power Jumps 26-Fold

HP Adds High-End Minis to 1000 Series

By Jeffry Beeler
CW Staff

PALO ALTO, Calif. — Performance as much as 26 times that of rival computers is said to be available with two upper-end additions to the Hewlett-Packard Co. 1000 family of processors.

Dubbed the F-Series, the additions occupy a place somewhere between the middle and high end of the minicomputer product spectrum, an HP official explained.

The F-Series consists of the models 2111F and 2117F processors, which reportedly provide identical arithmetic capabilities and differ only in their main memory and I/O capacities.

Model 2111F stores 64K to 512K bytes on as many as five MOS main memory modules and accommodates nine I/O cards, the HP spokesman said. Model 2117F, meanwhile, holds 128K bytes to 1M byte on up to 10 memory modules and provides 14 I/O slots, he added.

Both 16-bit F-Series processors are said to calculate the sine of a number in 47.6 microsec, compared with an estimated 400 microsec to 500 microsec for previous members of HP's 1000 family. They also reportedly add in 630 nsec and multiply in 1.8 microsec.

HP officials attribute the F-Series' computational speed to five hardware and software features previously unavailable in the company's product line. These features include a Scientific Instruction Set (SIS) that executes transcendental and logarithmic functions in hardware; a separate floating-point processor; an RTE-IV operating system that accommodates data arrays as large as 2M bytes; a set of 15 Fortran-acceleration routines; and main storage consisting of 16K-bit random-access memory (RAM) modules that cycle in 350 nsec, the company official said.

HP 1000 Model 45

All these features are available separately or together as part of two F-Series systems, the HP source explained. One of these systems, the Model 25, incorporates a 2111F processor and mainly suits dedicated engineering and scientific applications, while the other system — dubbed Model 45 — uses the 2117F computer and performs more generalized technical jobs, he said.

Graphics Software

Model 45 also reportedly comes with a Graphics 1000 graphics software package that can execute the same program — without conversion — with three models of HP display terminals — the 2648A raster-scan unit, the 7254 thermal plotter-printer and the

(Continued on Page 140)

Virtual Storage Family Gets Low-End Extension

By Jeffry Beeler
CW Staff

LOWELL, Mass. — A system that can reportedly expand from a desktop computer to a supermini — without programming changes — has been added to Wang Laboratores, Inc.'s line of virtual storage systems.

Dubbed the WCS/50, the product reportedly represents a low-end extension of Wang's 2200VS-based small business system family, which also includes the WCS/60 and WCS/80, both introduced last October.

A minimum WCS/50 configuration incorporates a 2200VS-B central processor with 64K bytes of core main memory, an integral 312K-byte diskette drive unit, system console, user terminal,

(Continued on Page 142)

Wang WCS/50

Service Bureau Benefits As Small Systems Vendor

FALMOUTH, Maine — By entering the stand-alone systems business, the owner of a small service bureau has found he can stem the loss of customers to hardware vendors and at the same time double his company's projected revenues during the next two years.

In charting a new corporate course, The Computer Center has joined the small but growing list of time-sharing firms that have supplemented their traditional, on-line services by becoming suppliers of in-house small business systems. Among the names already on that list are two of the nation's largest service companies — Keydata Corp. and National CSS, Inc., both of which recently became hardware vendors in an attempt to combat the increasing economic lure of stand-alone computing.

According to John Marr, who founded The Computer Center 16 years ago, a growing problem at his and other computer service bureaus is simply a case of good business practices: the service bureau's customers outgrow the service and buy their own in-house computer system.

That first system is usually a minicomputer that performs traditional business DP: accounts receivable and payable, inventory control and payroll — exactly the jobs performed by service bureaus.

"A few years ago, the number of service bureaus was diminishing at an alarming rate of about 200 per year," Marr said. "This illustrates how hard it is to make it in this business. But if the serv-

(Continued on Page 143)

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Insurance Rating System Eases Agents' Task

By Ann Dooley
CW Staff

LOS ANGELES — "I don't know beans about how it works. I just know it's doing what it's supposed to," Bob Gerughty, vice-president of Zillgitt & Wright Insurance Agency, said in referring to his firm's Computer-Assisted Insurance Rating (Cair) system.

Since the agency started using the Insurance Systems, Inc. (ISI) system eight months ago to determine the most competitive insurance premium rates for clients, company officials have been able to do in five minutes what it used to take up to two hours to do," Gerughty said. "We've also caught up on the backlog," he added.

In states without "no-fault" insurance systems, many companies offer property/casualty automobile insurance at different rates. An agent's main concern is to match the consumer with the most economical rate for the type of coverage he requires, he said.

The task of comparing even one or two insurance companies' rates is time-consuming and difficult, and comparing more than two is almost impossible, he said.

But with the Cair system, it's possible to find the most economical rate and do the best job for clients, Gerughty said.

Zilligitt & Wright uses the system to learn the rates for as many as 20 insurance companies and then break the figures down into their component charges, he said.

New Tack

The agency previously tried several other computer systems, but they failed primarily because the company's personnel tried to force the computer to conform to their insurance workload. When they installed the current system, however, agency officials took the opposite approach and fit the insurance work to the computer's capabilities, Gerughty noted.

The Cair system uses an Applied Digital Data Systems (Adds) 980-A bisynchronous CRT terminal, which communicates over leased phone lines to a 128K-word Data General Corp. Eclipse C/300 minicomputer located at the ISI office in Irvine, Calif.

When a client explains what coverage he wishes and requests a price quotation, an agent keys into the terminal the insurance companies he represents as well as rate-determining factors like the customer's age, sex, marital status, driving record, occupation, auto type, address and the amount of coverage requested.

The mini then processes the transmitted information and returns the requested data as a Comparative Premium Survey, which is displayed on the CRT terminal. The survey lists the insurance companies' premiums in ascending order and by type of coverage — disability, homeowner's, medical and auto.

Information on which these surveys are based is continually updated to reflect changing insurance rates, Gerughty added.

With the system, agents and customers can also specify monthly, quarterly or annual premium billing. Also included in the survey are assigned risk plan quotations, according to Gerughty. Companies that are contacted but unable to quote a figure because of unacceptable insurance risks indicate their inability to cover the client.

Each company has its own set of coverage rules that were very confusing without an automated system to handle the information, Gerughty explained.

Two High-End Processors Added to HP 1000 Series

(Continued from Page 139)

9872A four-color graphics plotter.

Intended for computer-aided design, simulation and other applications requiring extensive trigonometric and logarithmic calculations, the SIS is said to incorporate nine instructions — sine, cosine, tangent, arctangent, hyperbolic tangent, square root, exponent, logarithm to the base 10 and logarithm to the base e.

In both the F-Series computers, all these instructions are implemented by the discrete floating-point processor, whereas with most other minicomputers they have traditionally been performed with software subroutines, the HP spokesman said.

By computing floating-point numbers in hardware rather than in software, the F-Series processors can simplify applications involving the frequent manipulation of three-dimensional, computer-generated displays, he added.

In addition to executing the SIS, the floating-point processor implements 10 floating-point arithmetic instructions, HP noted. Attached to the 2111F's and 2117's main data bus, the unit uses Schottky logic and provides an accumulator for performing iterative calculations, the company official said.

Speeds Fortran Operations

With the 15 Fortran acceleration routines, the floating-pointprocessor also reportedly speeds by two to 20 times individual Fortran operations like parameter passing between subroutines and array address calculations. As a result, the acceleration routines and the separate hardware processor improve overall program performance by an estimated 50% to 70%, the spokesman said.

Another feature that contributes to the F-Series' processing speed — the RTE-IV operating system — reportedly allows users of Fortran programs to specify 2M-byte data arrays that are transparent to the programmer. Most other 16-bit minicomputers, by contrast, manage data arrays only as large as 64K bytes unless users segment or otherwise modify their programs, the official claimed.

Able to support up to 54K bytes of user program code in each of 64 memory partitions, RTE-IV represents an extension of HP's RTE-III and RTE-M operating systems, the spokesman said.

By itself, the 2111F processor costs $12,250 with 64K bytes of main memory and $33,000 with 512K bytes. A stand-alone 2117F with a 1M-byte main memory sells for $54,500.

An F-Series Model 25 system with RTE-M operating software, a 64K-byte main memory and an HP 2645 console terminal costs $27,500, compared with $85,000 for a Model 45 system with RTE-IV, a 1M-byte memory, an HP 2648A graphics console terminal and a graphics software package.

Deliveries of the processors and systems require 16 weeks from HP at 1501 Page Mill Road, Palo Alto, Calif. 94304.

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CIRCULATION DEPARTMENT

Processing Time Almost Halved

Claims Generator Boosts Adjuster's Accuracy

BUFFALO, N.Y. — One of the largest public insurance adjusters in this state has improved the accuracy of its insurance loss estimates and speeded its processing almost twofold after replacing a paperbound system with a minicomputer-based claims generator.

National Fire Adjustment Co. (NFA) switched to the Prime Computer, Inc. time-sharing system two years ago. Since then, the company has produced estimates 25% to 40% faster than before and has cut typing four-fold.

The time-sharing system has also lowered the firm's clerical error rate and thus reduced the cost of checking, rechecking, retotaling and retyping, a spokesman said.

Most people insure homes and businesses against fire and flood and assume the insurance company will simply hand over a check if disaster strikes, but often an insurance company will disagree with a policyholder's itemized loss claims. To establish the validity of his claim, a policyholder often hires a public insurance adjuster such as NFA to prepare and negotiate a settlement.

Former Inaccuracies

Before it computerized, NFA used manual methods to generate loss estimates. One of NFA's estimators went to a site and made rough notes detailing the damage, and then calculations were made to convert the notes into a dollars-and-cents loss estimate. Each estimator had his own note-taking style, which the person making the calculations had to translate. As a result, errors often occurred.

To speed their work, the employees calculating the figures memorized — often mistakenly — prices for building materials and labor. The whole process proved error-prone, time-consuming and inefficient, NFA president Frank Papa said.

So, several years ago, when NFA received hundreds of insurance claims following a flood in the western part of the state, "we decided to take a critical look at the manual claims handling process NFA had been using for the past 56 years," Papa said.

As part of the reassessment, NFA retained Custom Computerization Service, Inc. (CCS), a local consulting firm, which designed and implemented a computer-based claims generating system tailored to NFA's style of operation.

Under the current system, an estimator at the loss site makes notes on a simplified form designed for computer input. Then a typist enters the data on a terminal — a procedure that reportedly eliminates both intermediate processing and final typing.

Based on thousands of computer-stored building materials and services costs, the system then makes all the necessary calculations and — usually in less than half an hour — outputs the finished estimate with a line printer.

The whole process now routinely takes a few hours, compared with several days using the previous system. As a result, processing backlogs have disappeared, Papa said.

Built around a Prime 400 CPU, the system incorporates a 9-track magnetic tape unit. In addition, it has two data input terminals, a 300 line/min printer and a software development terminal plus a control terminal for system monitoring, interfacing and error messages. Both terminals provide backup for data entry.

Business Expanding

In addition to other benefits, the in-house mini has allowed NFA to expand its business to other cities without sacrificing service quality, Papa said. "Previously, starting an office in another city meant hiring and training a complete staff.

"Now, the only requirements are an estimator and a phone connection to the computer in Buffalo. We've expanded from four offices, all in upstate New York, to seven offices, including two in Pennsylvania."

Software for the system was written in Fortran, and the system initially ran on a commercial time-sharing computer, with input terminals at NFA's local office.

Transition to the computer system created few if any operational hitches, Papa recalled. NFA's estimators needed one three-hour training session to convert to the system, and typists switched after an hour's instruction.

Flexibility represented the most important factor in NFA's decision to choose the Prime system over rival configurations, the company president explained. "Our system's Primos operating software allows up to 63 time-sharing users to use any of several computer languages simultaneously."

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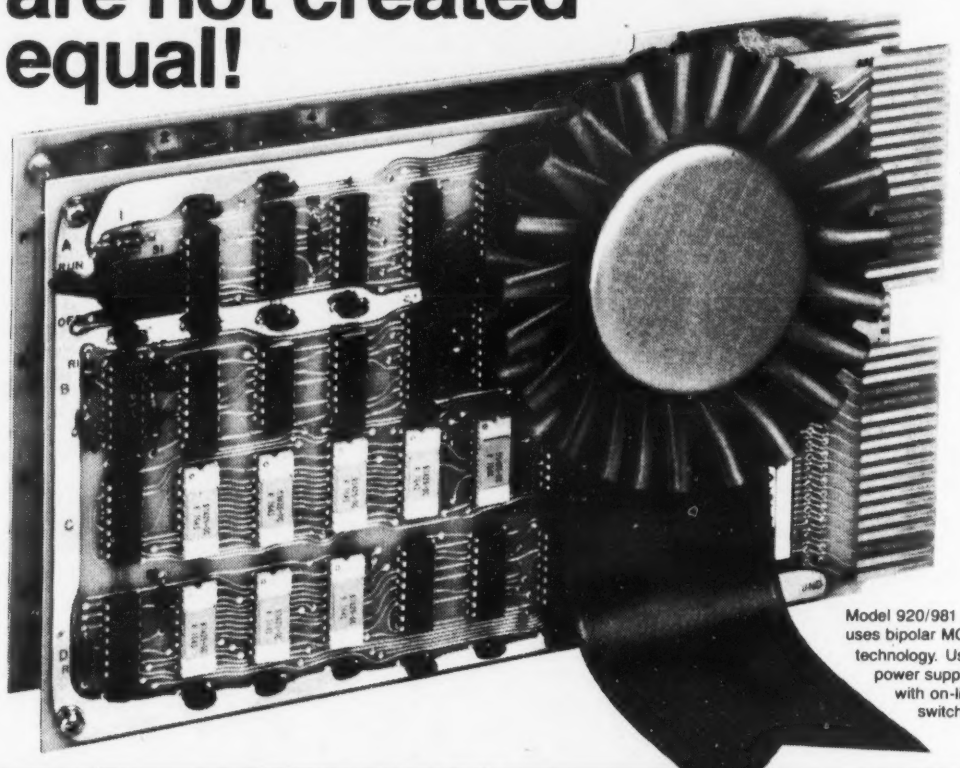

Model 920/981 uses bipolar MOS technology. Uses CPU power supply, comes with on-line/off-line switch.

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Wang 2200s Get Hard Disks

LOWELL, Mass.— While it was adding the WCS/50 to the low end of its virtual storage systems line, Wang Laboratories, Inc. was also reportedly introducing a family of software-compatible hard disk units.

Designed to operate with Wang's 2200 series of small business systems, the 2260C family consists of four models that permit unhindered expansion from 2.5M- to 20M-bytes, according to spokesmen for the firm.

The 2.5M-byte unit is said to access in 20 msec; the 5M-byte model, in 28 msec; the 10M-byte product, in 40 msec; and the 20M-byte module, in 40 msec.

Available with both fixed and removable media, all four models transfer 312.5k byte/sec, use FM recording technology and store 2,200 bit/in. on disks with 200 track/in., a Wang official said.

The 2.5M-, 5M-, 10M- and 20M-byte units cost $7,000, $9,000, $11,000 and $18,000, respectively. Deliveries, which take six to eight weeks, will begin June 15 from Wang at One Industrial Ave., Lowell, Mass. 01851.

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Three Models Available

Magnetic Tape Units Unveiled by Datapoint

SAN ANTONIO, Texas — Datapoint Corp. has introduced an additional line of magnetic tape systems that are reportedly compatible with the company's existing tape storage modules and with all its computers except the 1500 dispersed processor.

The line of 10.5-in.-reel systems is said to consist of three models that operate at up to 25 in./sec and store as many as 5.7 million characters.

Model 9556, a 9-track unit, stores 800 bit/in., Datapoint officials said. Model 9558 holds 556 or 800 bit/in. with seven recording tracks, and the 9-track Model 9584 records 1,600 bit/in., the company spokesmen added.

All three models reportedly use .5-in. wide recording tape and provide a nominal inter-record gap of .6 in. They also use dual-gap, read-after-write magnetic head assemblies and VP, LRCC and CRCC for error control, the company explained.

The models' drives and controllers connect to the I/O bus of Datapoint processors without additional interconnection equipment, the officials said.

Models 9556 and 9558 cost $10,500 and lease for $290/mo in a three-year contract, with an $80 monthly maintenance fee. Model 9584, meanwhile, costs $14,400 and leases for $400/mo in a three-year contract, with an additional $115/mo required for maintenance.

All three models are also available in one- and two-year leases and for short-term rental from Datapoint at 9725 Datapoint Drive, San Antonio, Texas 78284.

Virtual Storage Line Extended at Low End

(Continued from Page 139)

120 char./sec Model 2231V-2 printer, optional 200 line/min printer and two input/output processors (IOP).

One of the IOPs, the Model 22V02, controls the system's integral diskette unit and up to three 10M-byte disk drive products, a spokesman said. The other IOP, the Model 22V01, controls a line printer and as many as three 2246P workstations, he added.

The configuration is also said to include a virtual operating system, utilities, Assembly language and a choice of Basic, RPG-II or Cobol.

To this basic hardware/software combination, users can add up to two increments of 64K-byte main storage, 75M-byte disk units and two additional IOPs, the spokesman said. With the expansions, the WCS/50 will accommodate a maximum of 192K bytes of main memory, 150M bytes of disk storage and 11 workstations, he added.

Moreover, Wang said, because of its virtual storage capability, the configuration can reportedly continue expanding until it becomes indistinguishable from the WCS/60, the next most powerful member of the WCS small systems line. When upgraded to its maximum potential, the configuration equals the performance of the Wang family's largest system — the WCS/80, which can incorporate up to 512K bytes of main memory, 2.3G bytes of disk storage and 23 workstations, the company official said.

Thus, starting with a minimum WCS/50 configuration, users can reportedly expand their systems from IBM 5110 to Digital Equipment Corp. PDP-11/70 processing power merely by adding core memory and IOPs.

A minimum WCS/50 configuration costs $38,000. Wang is at One Industrial Ave., Lowell, Mass. 01851.

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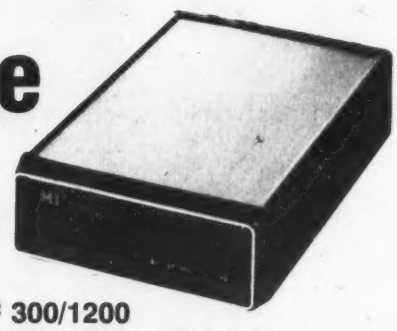

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Service Bureau Benefits As Small Systems Vendor

(Continued from Page 139)

ice bureaus can think of new ways to approach the business, they usually can hold on."

'Break-Even Point'

Shortly after Marr lost a service bureau customer to a Data General Corp. minicomputer system in late 1976, the bureau president started to become conscious of "the break-even point" at which service bureau costs roughly equal the costs of owning a minicomputer or adding new applications with a mini.

"For most companies, this break-even point comes when their combined service bureau charges and new applications development costs hit the $1,200- to $1,500/mo range," he said. "This means they can own their own computer, with all the additional advantages ownership offers, for less than continuing with the bureau."

The same principle holds true for many departments of large companies tied to mainframes.

More and more of those departments are finding they can enjoy all the advantages of a computer in their department, lessen the burden on the mainframe and reduce overall company costs, Marr added.

Before he started losing customers to minicomputers, Marr knew little about the machines. After working for IBM for seven years, he founded The Computer Center in 1962. When he started losing some large accounts to the small computers, he decided they merited examination.

Four Systems Evaluated

To help evaluate available minicomputers in 1976, Marr contacted a consultant who had considerable computer hardware and software experience. Together, they checked four major vendor's systems.

Although impressed with the DG Nova, Marr postponed buying any minicomputers.

When the CS/40 systems were announced in May 1977, however, he became one of the first to acquire and market the interactive Cobol-based small business systems.

Marr chose the CS/40 systems, he said, because the Interactive Cobol reduces both the cost and complexity of systems development.

"The first system was the hardest to develop, but the development of subsequent systems has proceeded well," the president said.

'DG's CS/40 hits the crux of the business community because most people can fit into the CS/40's range of offerings."

Other Plans

In addition to the CS/40 range, Marr has considered selling packaged DG Eclipse systems as well as the firm's Micronova systems.

"To get the business started," he said, "you must have a person well experienced in systems software, and you must have a good computer system to sell.

"Thus far we have sold six systems. We have as many more on the way, and we also have generated several additional solid prospects.

"It's an expensive proposition, but it will pay off," he added. Marr calculates that the payoff from combined system sales and DP services will boost his total business from its current $600,000 to $1.2 million within two years or less.

"We are finding the overall effect of adding the CS/40 systems has not been to cut into the service business, but to stimulate it," Marr explained. "The current forecast predicts the service business will increase between 15% and 20% this year.

"The addition of the CS/40 has enhanced our problem-solving capability. Now we can sell or service, with the customer's needs dictating the choice."

Floppy Disk Formatter Bows

SANTA ANA, Calif. — Almost any set of operating features and parameters required by large end users and OEMs can reportedly be programmed into a floppy disk drive formatter from Applied Data Communications, Inc. (ADC).

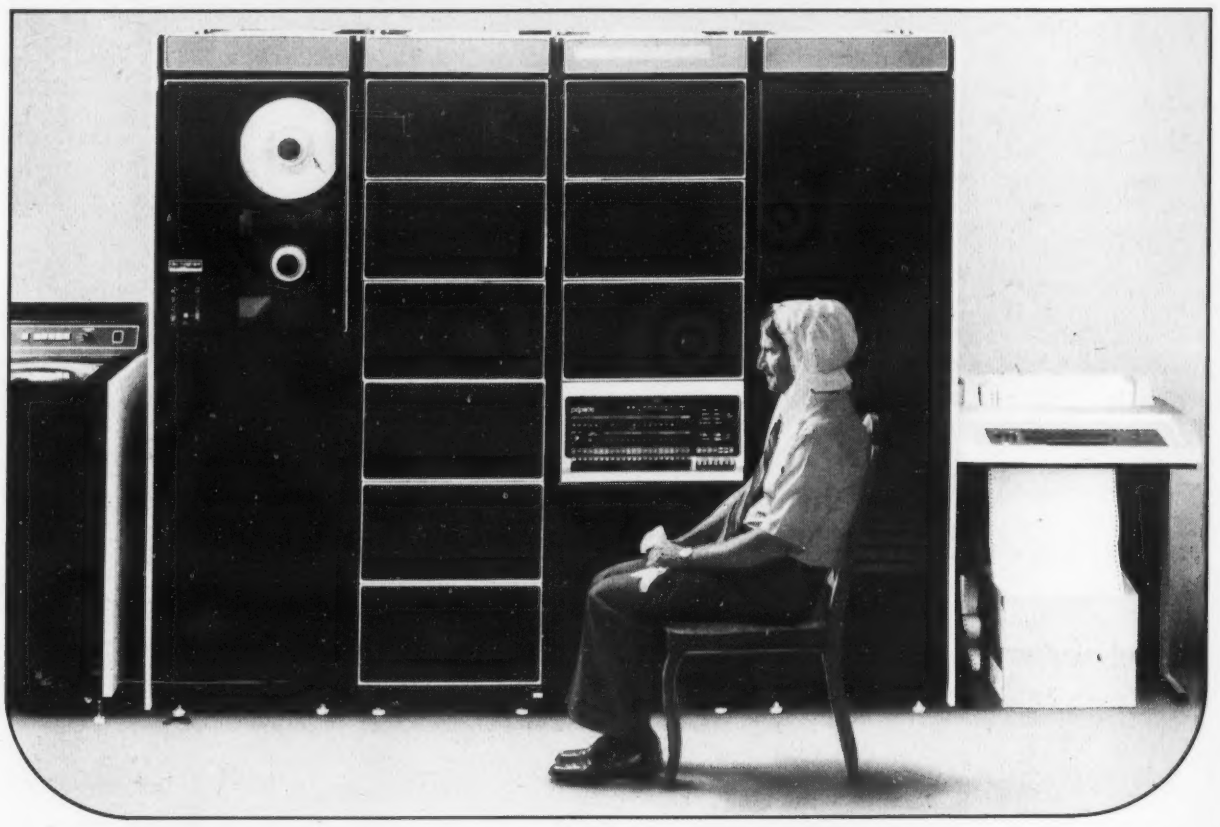
Model 61F-600 permits selection of both single-density FM and double-density MFM or M²FM modes with both single-sided and double-sided operation, according to ADC officials. Under host computer control, one formatter can accommodate up to eight mixed-density disk drive units with multiple formats, they added.

The unit is said to accept IBM-compatible formats as well as any other industry-standard and non-standard formats. It also accommodates floppy disk drive units from General Systems International, Inc., IBM, Memorex Corp., MFE Corp., Orbis Systems, Inc., Perkin-Elmer Corp., Pertec Computer Corp. and Shugart Associates.

Built around a Signetics 8x300 microprocessor with 256 bytes of storage, the formatter comes with sockets that store 2,048 additional words, the spokesman noted. It is also said to provide an 8x300 extension port for custom drive interfaces or system expansion.

Model 61F-600 costs $850 with quantity discounts available from Applied Data Communications at 1509 E. McFadden Ave., Santa Ana, Calif. 92705.

Does waiting for 11/70 Memory make you feel like Whistler's Mother?



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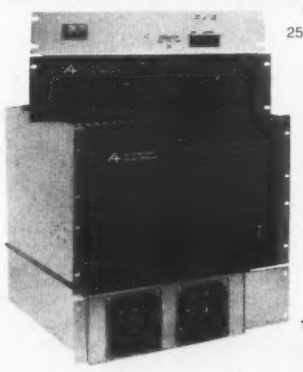

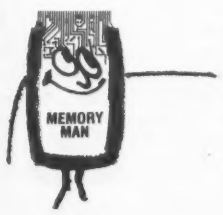

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Unibus Gets Transmission System

PALO ALTO, Calif. — Digital Equipment Corp.'s PDP-11 Unibus can typically be extended 100 meters with a remote transmission system introduced recently by Digital Pathways, Inc., according to spokesmen for the product's developer.

RTS-100 reportedly consists of two cabinets connected by 56 twisted wire pairs corresponding to the 56 Unibus lines. One of the cabinets is situated at the computer and the other at a remote site, Digital Pathways officials explained.

Standard Unibus extension cables connect the transmission system to the computer at one end and to the remote system at the other end, the officials added.

All transmissions between the central and remote sites are said to take place through differential line drivers and receivers.

Digital Pathways recommended the RTS-100 for users who want to secure their storage modules by operating the units and their CPUs from separate locations.

Excluding cable, the transmission system, which incorporates its power supply in the two cabinets, costs $3,300. Digital Pathways is located at 4151 Middlefield Road, Palo Alto, Calif. 94306.

HP Disk Memory Compatible With 3000

PALO ALTO, Calif. — Hewlett-Packard Co. has expanded its family of controller-compatible disk memories with the introduction of a moving-head model that the firm claims seeks in an average of 25 msec and transfers 937.5k byte/sec.

Compatible with HP's 3000 series of computer systems, Model 7925 reportedly stores up to 120M bytes of formatted data and comes with an optional controller and add-on disks.

The controller, which is compatible with its counterpart in HP's earlier Model 7906 and 7920 drives, accommodates as many as eight drives, company officials said. Because of this compatibility, users can add the 7925 to systems using the 7906 and 7920 units or mix the three models in any combination, the spokesman added.

Model 7925 stores data on a removable disk pack, one surface of which carries servo information for the products's track-follower head-actuating mechanism, officials noted.

Standard features are said to include error-correction-code hardware and the ability to operate at between 50°F. and 104°F. Marginally recorded data can reportedly be recovered under program control.

With a controller, Model 7925M costs $21,000, excluding an $89 basic monthly maintenance fee. Add-on disk units, dubbed Model 7925S, sell for $17,000 each with a $62/mo maintenance charge.

HP is located at 1507 Page Mill Road, Palo Alto, Calif. 94304.

Disk Controller Runs on PDP-11

PALO ALTO, Calif. — Automatic hardware-error correction and single-command, multiple-sector transfers of up to 64K words are reportedly available with a single-board disk controller from Minicomputer Technology, Inc.

Model SMC11 occupies one hex-wide slot of a Digital Equipment Corp. PDP-11 and accommodates drives compatible with Minicomputer Technology's Storage Module line of controllers, company officials explained. Drives accepted by the controller include those from Ampex Corp., California Computer Products, Inc., Control Data Corp., Kennedy Co., Memorex Corp., Microdata Corp. and Okidata Corp., the spokesmen noted.

Additional features available with SMC11 are said to include dual-access support, bad-sector flagging and the ability to mix drive capacities.

Software support for the controller reportedly includes a stand-alone diagnostic and formatter program plus RSX-11, RT-11 and RSTS-3 compatible drivers.

With single-drive cabling and one-year warranty, the product costs $3,580 with OEM discounts available. Minicomputer Technology is located at 2470 Embarcadero Way, Palo Alto, Calif. 94303.

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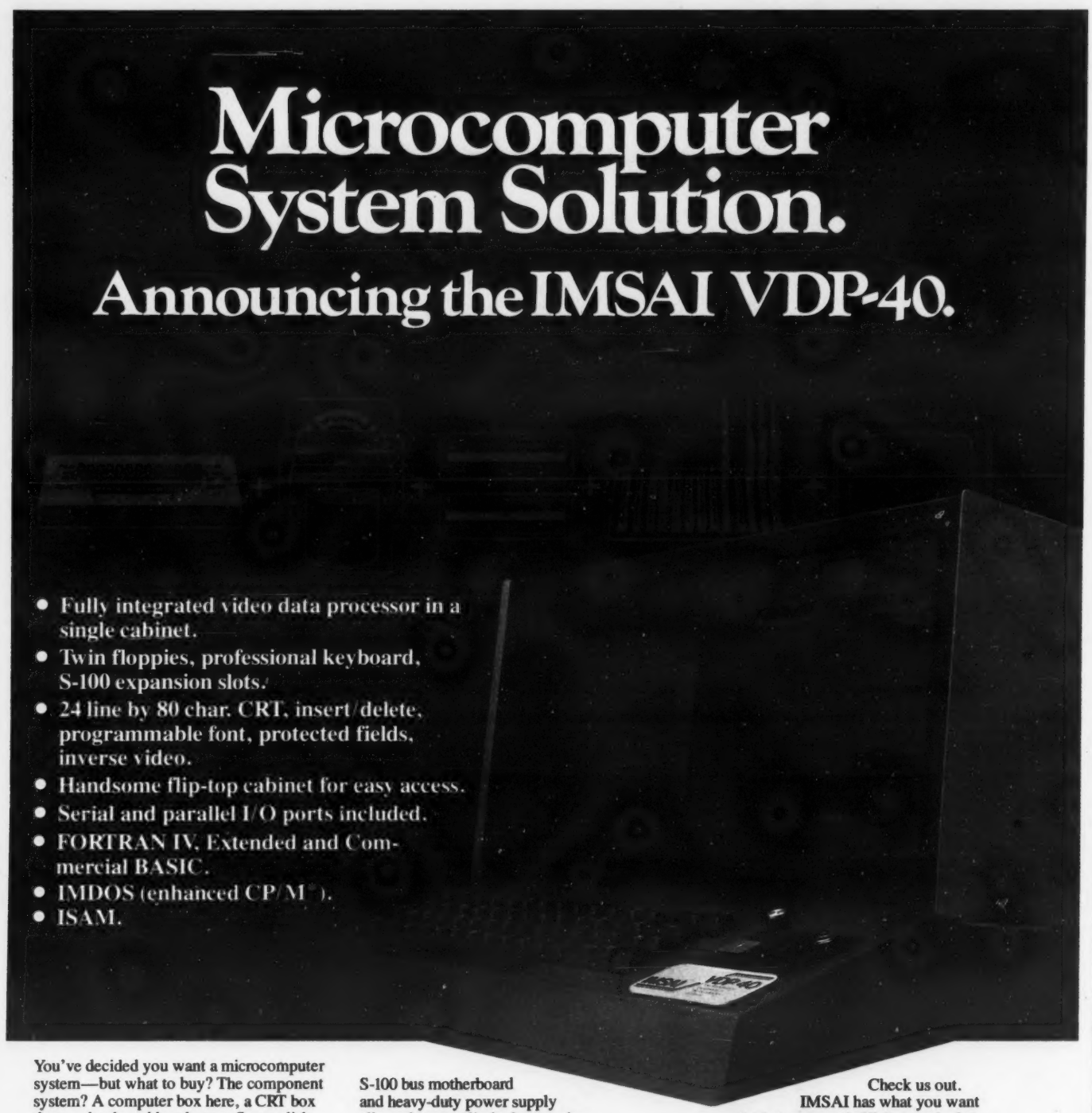

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Mini Makes Air Cargo Firm's Backlog Take Off

By Ann Dooley
CW Staff

CANTON, Ohio — Rapid sales growth was causing a backlog of freight bills, accounting statements and other paperwork for Rapid Air Freight, Inc. (RAF) until the air cargo firm decided to automate its operations with a minicomputer system that promises to yield an annual savings of as much as $50,000.

Before the firm acquired the current system, its backlog of unprocessed bills had so constricted cash flow that billing was running as many as 90 days behind schedule, according to the company's president, Frank Sukosd.

As a result, RAF's clients often received their bills too late to apply to the appropriate month's accounts "and our credibility was being jeopardized," Sukosd recalled.

At first, the air cargo firm tried to process the surplus paperwork by hiring additional clerks, but that attempt proved unsuccessful in meeting the company's growing needs.

'No Way to Run Business'

RAF also faced the problems of finding an improved method of responding to customer inquiries about shipments, Sukosd said. If a customer wanted a shipment traced, the company typically needed 20 minutes to find the appropriate source document and locate the desired information.

"When you average 200 inquiries a day, that is a lot of time wasted — not to mention the frayed nerves," Sukosd said. Moreover, because few callers will wait 20 minutes on the phone, RAF often had to return customers' long distance calls at its own expense.

Recognizing that "this was no way to run a business in this day and age," Sukosd began to consider installing an in-house computer.

At first, he investigated a computerized airline system, but he soon concluded RAF lacked both the financial resources and the physical space to support such a system.

Next, Sukosd evaluated equipment from several manufacturers including Data General Corp., IBM and Honeywell Information Systems, Inc. and finally selected a 64K-byte Univac BC/7 minicomputer.

In the year since its installation, the RAF system has saved an estimated $20,000, and that figure excluded the value of improved customer service and savings in various internal functions, Sukosd said.

When it becomes fully operational, the system could cut the firm's overhead by as much as $50,000 a year, he added.

Another advantage of the system is that it can be modified in-house to meet the firm's changing business needs, Sukosd said.

To generate a shipping document, all relevant information such as date, company, invoice number, destination and airline charges are entered into the system through CRT terminals and stored on disk. Later, the system's 125 line/min printer generates a shipping receipt.

As a result, RAF can collect receivables every 31 days instead of every 105 days, as was the case with the previous billing system, Sukosd noted.

One of the system's main applications is tracking freight bills. After a shipment is completed, RAF enters freight bill information like billing number, airline code number and flight number exactly as it appears on the source document.

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Draws From Own Experience

EPA Outlines Plan for Implementing Minis

WASHINGTON, D.C. — Minicomputer users can best ensure smooth installation and program conversion if they develop a well-conceived implementation plan covering hardware, programming and system integation the Environmental Protection Agency (EPA) advised here recently.

The EPA was speaking from experience, since the agency has just finished converting to a minicomputer system and confronted many of the problems and delays that can occur.

An implementation plan helps control the work flow and leads to better project structuring, planning, estimating and communications among those involved with the conversion project. Such a plan can also help spot problems before they occur and aid in solving or avoiding them, according to the EPA.

Seven Phases

A thorough implementation plan should divide into seven phases which include a converison design phase that outlines methods for changing programs and conducting the conversion; a hardware installation phase that includes site preparation, delivery, installation and acceptance testing of the equipment; and a programming phase that includes recoding and testing of the converted modules.

The remaining phases are the integration and system test phase, which includes thorough software testing; an acceptance test phase that formally signifies the readiness to make the conversion; a conversion phase, which is the physical changeover to the minicomputer; and finally, the operation and maintenance phase, which is the daily use of the system, EPA spokesman noted.

In a written review of its minicomputer installation experiences, the EPA further divided each of the seven main implementation steps into the following substeps:

- Assumptions.
- Work products and major activities.
- Resource requirements and task estimates.
- Task priorities and interdependencies.
- Schedules.
- Budgets.
- Milestones.

The assumptions section of the implementation plan provides a checklist of situations to be considered during the planning and implementation processes, according to the EPA.

It also helps identify unknown factors that could significantly influence an implementation plan.

The "work products and major activities" substep provides the basis for identifying implementation tasks, according to the EPA. Once the work products and activities are defined, they can be broken up into smaller and more controllable tasks and goals.

Installations converting several applications should consider each application separately. The applications to be given the highest conversion priority should be those with the highest economic return, the EPA advised.

All resource requirements should be identified and all tasks should be assessed before users create an implementation schedule, the EPA noted.

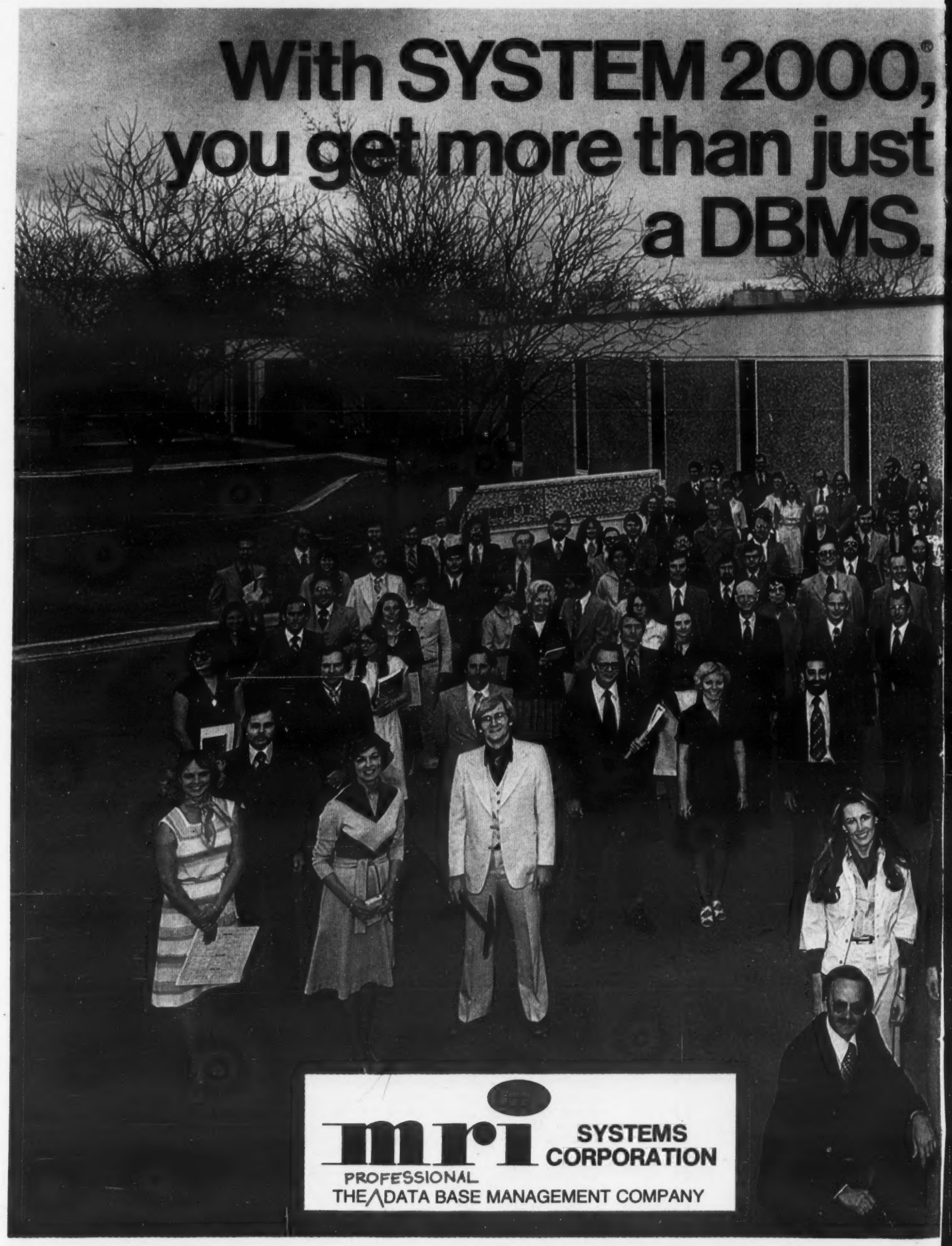
The resources to be identified include personnel; computer equipment; operations software for development and testing; and major expense items such as extra training, travel or special equipment. Once these are identified, the length of time it will take to complete each task must be estimated, according to the EPA.

Next, priorities must be established and interdependencies among tasks must be recognized before a schedule can be plotted, the EPA said. For all but the most complex plans, a list of priorities and interdepenencies is usually enough.

Combine Substeps

The overall project schedule combines the results of the

(Continued on Page 148)



Memory Fits LSI-11, PDP-11

WESTLAKE VILLAGE, Calif. — Users can expand Chrislin Industries, Inc.'s semiconductor memory board from 8K to 32K merely by replacing the product's 4K by 1 dynamic memory devices with their 16K counterparts, according to the unit's developers.

Available with either on-board distributed refresh or external refresh control logic, Model 1103 reportedly comes in 8K, 16K, 24K and 32K memory versions that plug into Digital Equipment Corp.'s LSI-11, LSI-11/2 and PDP-11/03.

Measuring 8.44 in. by 5.187 in., the memory module stores up to 128K words in 2K increments, accesses in 350 nsec, cycles in 525 nsec and consumes less than 7W, Chrislin officials said.

Model 1103 costs $390 in an 8K by 16 version and $995 in a 32K by 16 version. Delivery takes two to three weeks from Chrislin's Computer Products Division at Suite 102, 31312 Via Colinas, Westlake Village, Calif. 91361.

Cartridge Disk Controller Occupies PDP-11 Bus Slot

GARDEN GROVE, Calif. — Cartridge disk units storing 2.4M-to 80M bytes can reportedly be linked to Digital Equipment Corp. PDP-11 systems with a singleboard controller introduced by Distributed Logic Corp.

Dilog I occupies one peripheral controller slot in a PDP-11 Unibus, a Distributed Logic spokesman said.

The microprocessor-based product permits automatic self-test diagnostics of disk drive units, the controller itself or CPUs, the spokesman added.

Software-transparent to DEC's RK11 disk systems, the controller is said to operate under RT-11, RSX-11, RSTS, IAS and Mumps operating systems.

Each Dilog I comes either singly or as part of a subsystem with cables and disk drive units, officials reported.

The controller costs $1,995 in quantities of 24 and is available from Distributed Logic at Suite G, 12800 Garden Grove Blvd., Calif. 92643.

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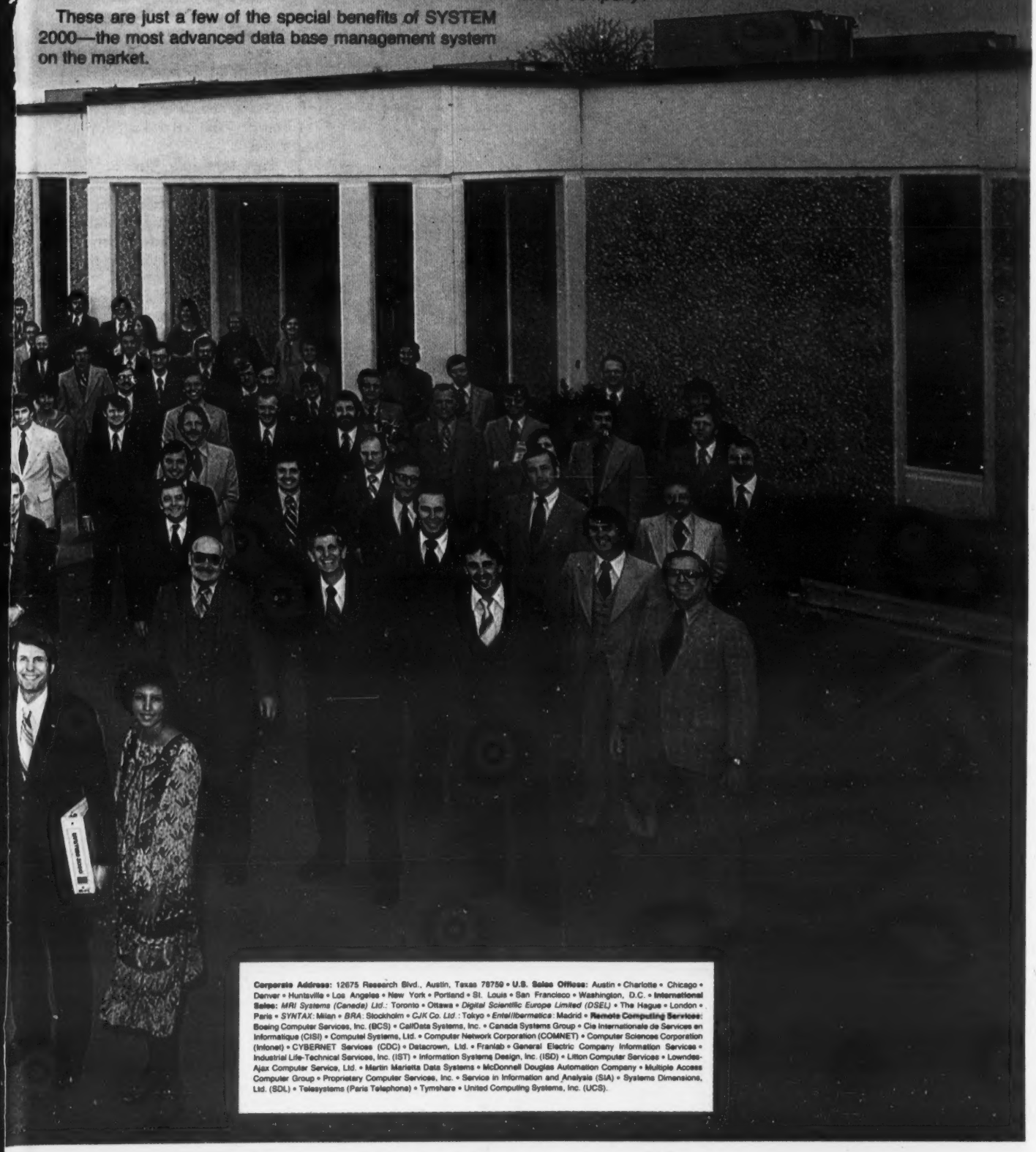

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- Data Base Design and Administration (2 days)
- Application Analysis Methods (2½ days)
- Report Writer Fundamentals (2 days)

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Core Add-On for PDP-8

CRANBURY, N.J. — Addressing capability of the Digital Equipment Corp. PDP-8 can reportedly be expanded from 32K by 12 to 128K by 12 when DEC's KT-8A memory management option is used with Dataram Corp.'s latest core add-on.

Packaged on one DEC hex board, the 32K by 12 memory unit accesses in 330 nsec and cycles in 1.2 microsec, Dataram officials said.

The 32K addition to Dataram's DR-118A core add-on family, which also includes 8K by 12 and 16K by 12 models, operates from +5V, -5V and +20V, the spokesman added.

The 32K DR-118A costs $2,380 from Dataram at Princeton-Hightstown Road, Cranbury, N.J. 08512.

Rolm Floppy Aids Software Work

SANTA CLARA, Calif. — A floppy disk system from Rolm Corp. is said to operate with or replace a moving-head disk unit in the company's programming station packages.

In the storage system, diskettes provide the medium for the firm's operating system, user data and part of the user's application program, Rolm officials explained.

Designed for software development for military applications, the disk system comes with a Model 3300 combination I/O interface that reportedly accommodates a real-time clock and links the programming station packages to two external devices plus a paper-tape reader and a paper-tape punch.

Floppy Disk Subsystem

In addition to the interface, the Model 3383 storage system incorporates an Advanced Electronic Design, Inc. 6200P floppy disk subsystem that includes the formatter and drive electronics for up to four Model 3384 floppy disk drives, Rolm spokesmen said.

Each of the system's diskettes stores about 12,500 lines of code, the equivalent of 313,396 16-bit words organized in the standard Rolm diskette format of 77 tracks, each with 16 256-word sectors, the officials added.

The system accommodates up to four drives, which hold a total of 1.25 million words, enough for about 50,000 lines of code, they said.

A basic Model 3383 costs $6,500, with add-on units selling for an additional $1,700. Rolm is located at 4900 Old Ironsides Drive, Santa Clara, Calif. 95050.

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EPA Issues Mini Tips

(Continued from Page 146)

previous substeps. These results must be analyzed before users try to determine how to use schedule-planning resources, the federal agency advised.

The schedule should take into account external responsibilities, availability of resources, vacations, holidays, sick time, personnel turnover and potential interruptions, the EPA said.

Budgets should include both professional services and expenses but estimates should differ depending on whether the implementation is performed in-house or contracted outside.

Milestones are significant points that coincide with the completion of project phases and can be used as checkpoints for control, the EPA noted.

Once the implementation plan is finished and approved, tasks should be assigned according to the schedule and the plan should be monitored closely through progress reports.

The progress report should record completed tasks, point out deviations and problems and provide background data. If problems arise, project leaders should be alerted so they can take corrective action, the EPA noted.

'Seen Any Interesting Minicomputers Lately?'

Control Lighting, Cooling

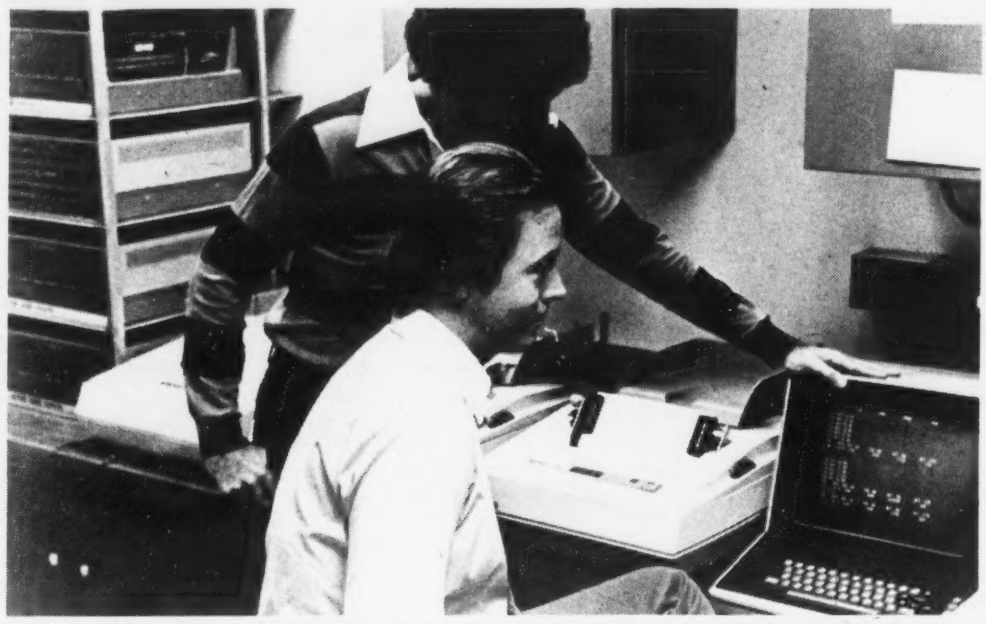
Micros Perform at Knott's Berry Farm

By Tim Scannell
CW Staff

BUENA PARK, Calif. — Four million people a year reap the harvest of a rather unconventional farm here that uses microcomputer technology to produce a crop of fantasy and amusement.

Knott's Berry Farm, the nation's oldest and third largest theme amusement park, has more than 100 rides and attractions distributed on its 150 acres of land. Three desktop microcomputers located at the park's Construction and Maintenance Division control and operate both the lighting and air conditioning of these activities, as well as scheduling and expediting the many jobs required for their upkeep.

The Mits/Altair 8800 microcomputers, manufactured by the Pertec Computer Corp., were assembled from kits by the division's Electronics Department, whose engineers had recently helped to install such thrill rides as the "Corkscrew" and the 20-story "Sky Parachute Jump."



Two members of Knott's Berry Farm's Construction and Maintenance Division check operations via one of three microcomputers.

Three Systems Supported

The units are used by the park's staff to provide for three central systems: the work-order expediting system, the lighting control system and the air-conditioning system, according to Mike Reafsnyder, director of the Construction and Maintenance Division.

The work-order system schedules the workload of the construction and maintenance crew, based on due dates and priorities that have been assigned to the various jobs. When more than one shop is involved in a particular job, Reafsnyder explained, the computer takes this into consideration and coordinates the different shops that are involved.

A printed listing that shows all jobs in priority order is furnished periodically to the division's various managers.

In the lighting control system, the computer provides centralized control to turn on and off at prespecified times the many groups of lights throughout the farm.

"While we have our regular lighting schedule that remains fairly constant, we can also enter the 'on' and 'off' times for special events that require lighting at unscheduled times, such as in our theatre and 'Wagon Camp' exhibit, for example," according to Ralph Ruffalo, who oversees the operation of the division's computerized systems. "Then, after the special event is over, the times are purged from the memory and the system reverts to its normal schedule."

All of the farm's lighting, except for a few parking lots and other peripheral areas, is under computer control. "While the lighting is currently divided into just 11 sections for control purposes, we do intend to break it down more finely in the future," Ruffalo noted, "the system has the capability of controlling up to 100 separate lighting areas."

Energy Conservation

The primary purpose of the third computer-controlled system is to conserve energy and minimize Knott's Berry Farm's electric utility bills through air-conditioning control. "The system compares actual kilowatts being used by the entire farm at any given moment with the number of kilowatts that has been designated as a standard for that particular day," Ruffalo explained. "Whenever the actual kilowatt amount exceeds the standard, various air-conditioning units will begin to cycle off and on at short intervals — usually every 10 minutes.

"All the air conditioners on the farm are grouped into three different priorities," Ruffalo pointed out, "and the computer automatically searches its memory, finds the air conditioners in the lowest priority group which are running at the time the signal to begin cycling is received and selectively begins to cycle these units.

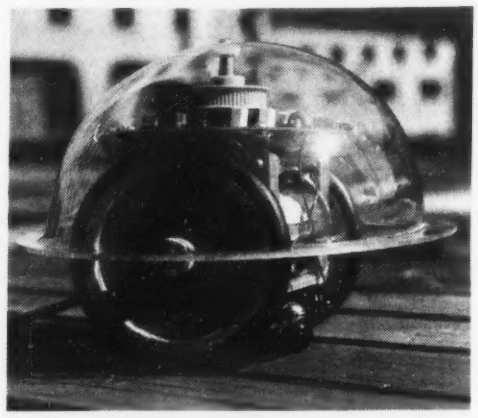
"If cycling a major portion of the lowest priority units does not return power to standard, the system will begin cycling the next priority group. It will continue this procedure until actual kilowatts return to the standard amount," he said.

One additional feature built into the system guards against excessive peak power usage, which could adversely affect Knott's Berry Farm's utility rate structure. In the event power usage reaches a maximum kilowatt figure, the system would continue to cycle as before, but increase the "off" times by 20%.

"At present, a large part of the farm's air conditioning is on the computerized system, and we are still in the process of adding more air conditioners to it," Ruffalo said. "The present system can handle up to 100 individually controlled units; with about 50 on the system now, we still have a lot of room for expansion."

While each of the Mits/Altair microcomputers is dedicated to a specific application, any one of the systems can be switched as

(Continued on Page 150)



When . . .

. . . is a Turtle not a turtle? For the answer to this reptilian riddle, see Page 151.

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Suggests Contemporary Applications

Consultant Warns Micros Must Do Real Jobs

By Tim Scannell
CW Staff

BOSTON — The average consumer in the American marketplace does not understand the technology behind the microcomputer and would much rather avoid it if at all possible, according to Jerry Wasserman of Arthur D. Little, Inc.

"It is difficult to accept that a world that has been unable to provide enough software engineers to satisfy the needs of industry will suddenly inspire the vast number of nonmathematically oriented people to learn a discipline just to play games or even to educate themselves," Wasserman said at the recent Electro/78.

Wasserman's speech — "The Home Computer in the Next Five Years: Fad or Revolution?" — was one of 36 sessions presented at the three-day electronics show and convention, sponsored by both the Institute of Electrical and Electronics Engineers and the Electronic Representatives Association.

The home computer is currently heralded as "the new market conqueror," Wasserman said, even though nobody knows exactly what its function is, aside from being used to play games and plan menus. The microcomputer is simply another "glamour product," developed to keep the "cookie ovens of the semiconductor industry going," he contended.

"We are no longer a society which is technology-driven," Wasserman said. "To be successful in the emerging markets, particularly in the consumer arena, new products must meet real needs, satisfy actual wants and provide benefits that are easily perceived by the user as well worth paying for."

Wasserman suggested personal computers be geared toward the contemporary needs and problems of the average consumer. Applications that are concerned with energy monitoring, home security and water usage are of greater significance than programs dealing with games and video exercises, he stated.

The industry "should take advantage of the 70 million households that exist in the U.S. and the approximately two million living units that are built every year by offering command and control products that satisfy the present and future needs of household management."

Appliances that incorporate microcomputers to prepare individual meals at preset times and energy control systems that sense humidity and temperature variations in the home would be readily accepted by consumers because they have worthwhile functions, Wasserman said.

Transitory Acceptance

Although he acknowledged that advanced video games and home computers are being met with high enthusiasm and consumer interest, Wasserman believes this initial acceptance is, at best, transitory.

"The long-term viability of the home computer depends upon its ability to meet the underlying consumer needs," he stressed. "If the electronics industry takes the time to understand those market forces that need the capabilities of the home computer, the manufacturers will have success."

However, if manufacturers intend to market the microcomputer as an extension of the video game, "we will have another in our line of business disasters, as we had with the calculator and the electronic watch," he said.

CW at Electro/78

NCC Sees Report Debut

ANAHEIM, Calif. — Vantage Research is distributing its debut issue of a newsletter about personal computing at the National Computer Conference here this week.

"The Personal Computing Industry Report" covers hardware and software, product reviews, company profiles, technology forecasts and applications case studies, according to a spokesman.

The newsletter is available at an annual subscription price of $195 from Vantage, 770 Welch Road, Palo Alto, Calif. 94304.

Trio Controls Knott's Farm

(Continued from Page 149)

needed to any of the three application areas, Ruffalo noted. Additional hardware includes three Ann Arbor Terminal, Inc. terminals, three Okidata Corp. 110 char./sec. line printers and three disk drives with a total capacity of 300K bytes of floppy disk storage.

The Construction and Maintenance Division plans to add yet another application to the system — inventory management. "This will help us keep better track of the parts that our various shops need," Ruffalo explained. "As shop personnel use up their parts, they'll note this on their daily work cards.

"We'll key this information into the computer, and it will tell us when we're reaching dangerously low inventory levels," he said.

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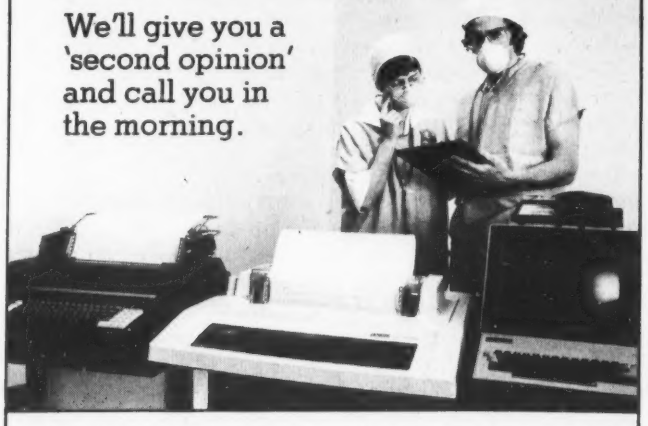

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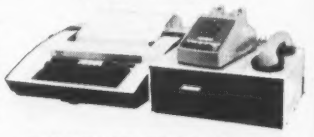

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Micro-Based Turtle Serves As Mapping, Teaching Aid

By Tim Scannell
CW Staff

CAMBRIDGE, Mass. — A senior at MIT here, not to be outdone by Mother Nature, has designed a computerized "turtle" that can be used to map rooms, solve mazes or teach simple geometry and programming concepts.

The Turtle, so named because of its remote physical similarity to the marine reptile, can "walk" on 2-in. radius wheels, "talk" with its two-tone speaker, "blink" using two red lights and "feel" by using its clear plastic dome as a touch sensor, according to William Hillis, the unit's designer. The device connects to an 8080-based microcomputer via a 10-foot cable and a standard parallel interface.

The Turtle, through the microcomputer, can be programmed to perform a variety of tasks, Hillis said. For instance, when placed in a room and activated, the unit will follow the room's contours using its touch-sensitive dome as a guide. The device will "remember" where furniture is placed in the room (backing off when it collides with a table or a chair) and store in the microcomputer's memory a two-dimensional "view" of the area, Hillis said.

Then, upon command, the unit will lower a solenoid-controlled pen and proceed to draw a rough representation of the room — on any scale, Hillis claimed.

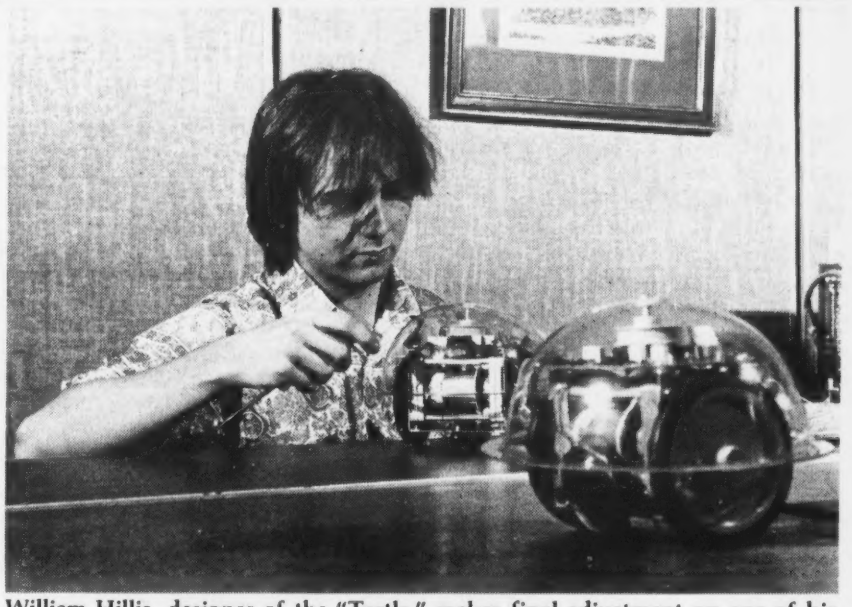
Demonstrates Geometric Principles

The Turtle can also be used to demonstrate basic principles of geometry because of its ability to illustrate complex designs and angles. Hillis recently loaned a version of his robot to an elementary school in the Boston area and discovered that students responded better to mathematical problems when they could see the results of their efforts.

Hillis built the device nearly two years ago while working on an educational project for MIT's Artificial Intelligence Laboratory. MIT has, in fact, used various types of turtles in experimental projects, Hillis explained, "but I designed one primarily as a teaching aid for autistic or mentally handicapped children."

Hillis has joined four other students, one of them a former high school classmate, to form Terrapin, Inc., which will promote the Turtle in the computer hobbyist market. In kit form, the device will retail for approximately $300, Hillis said, and it will cost $500 assembled.

The officers of Terrapin already have plans to improve on the original model by adding a longer cable and eventually introducing a cordless Turtle with a "built-in intelligence." Their goals in marketing, however, remain the same, Hillis said. "We want to produce a product we like and which other people will like."



William Hillis, designer of the "Turtle," makes final adjustment on one of his microcomputer-controlled robots.

Alpha Supply Offers Micro Coding Form

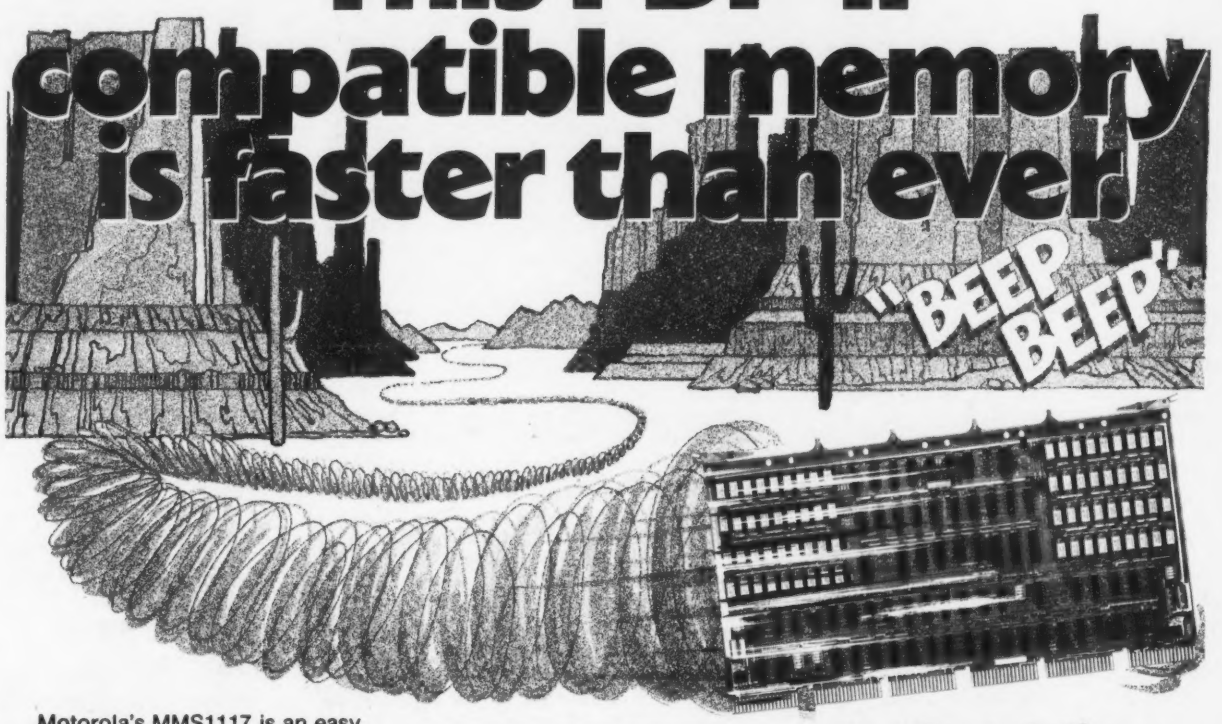
NORTHRIDGE, Calif. — The Alpha Supply Co. has introduced a coding form specifically designed for the microcomputer programmer.

The Micro Coding Form provides space for writing in symbolic language with provision for on-page conversion to hexadecimal or octal for machine entry, the firm said. The form facilitates hand assembly of programs by the programmer or development engineer and is useful as a debugging tool for generating and documenting patches for the MPU.

The forms are printed on 8-1/4-in. by 11-in. bond paper using dropout blue ink and they are bound 50 sheet/pad, the firm added.

The coding sheets are available as single pads for $1 each or packages of 10 pads for $7.50 from the company at 18350 Blackhawk St., Northridge, Calif. 91326.

This PDP-11* compatible memory is faster than ever.



Motorola's MMS1117 is an easy, inexpensive way to add-in high-density, high-speed storage with parity option features for your PDP-11 system. Now it's more than 20% faster than ever before. Speeds for all three MMS1117 speed options are significantly faster, with typical system Read Access Time of the fastest version reduced from 370 ns to 290 ns.

The MMS1117 provides total electrical and mechanical compatibility with *10 different* UNIBUS* PDP-11 processors: not only the 11/04 and 11/34, but the new 11/60 plus the 11/05, 11/10, 11/35, 11/40, 11/45, 11/50 and 11/55. It just plugs into any new Hex SPC slot (DD11B, DD11C, DD11D, DD11P).

Each speed option of the MMS1117 is available in your choice of 32, 64, 96, or 128 kilobytes. Each offers parity plus on-board parity generation and checking logic. There's no need for an external parity control module. The system imposes one UNIBUS load regardless of memory size and parity.

MMS1117 power requirements are low despite its speed and density. A fully populated 128 kilobyte system with parity and controller operates at the following rates: 5 V ±5% @ 3.0 A (typ), +15 V @ 0.2 A standby or 0.7 A continuous maximum access, and −15 V @ 0.03 A.

128 Kilobyte MMS 1117

Speed Option	Read Access Time (typical)	Price 1-5
Fastest	290 ns	$4,305
Faster	360 ns	$3,920
Fast	390 ns	$3,530

More Motorola Memory Systems

System	Organization	Description
MMS1110 MMS1110-1 MMS1110-2 MMS1110-3	16K x 16 12K x 16 8K x 16 4K x 16	Add-in for LSI-11 systems
MMS1118L	16K x 18	Add-in for PDP-11/05, 11/10, 11/35 and 11/40 systems with the MF11-L backplane
MMS1118 MMS1118-1 MMS1118-2	16K x 18 12K x 18 8K x 18	Add-in for PDP-11/04, 11/34 systems
MMS3400	32K x 18 or 64K x 9	For 3400N systems
MMS68102 MMS68102-1 MMS68102A MMS68102A-1	16K x 8 8K x 8 16K x 9 8K x 9	Battery backup for M6800 and other synchronous systems; pin-compatible with EXORciser† micromodule
MMS68103 MMS68103-1 MMS68103A MMS68103A-1	16K x 8 8K x 8 16K x 9 8K x 9	Hidden refresh for M6800-based systems
MMS68104	16K x 8	For MEK6800D2 Kit
MMS80810 MMS80810-1	32K x 8 16K x 8	For 8080A-based systems; pin-compatible with SBC 80/10/20

†Trademark of Motorola Inc.

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Hobby Havens

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ARKANSAS

Arkansas Computer Club (ACC). Contact: Elmer Wingfield, 26 Belmont Drive, Little Rock, Ark. 72204. Telephone (501) 562-4260.

CALIFORNIA

North Orange County Computer Club. Contact: Lorin Mohler, P.O. Box 3603, Orange, Calif. 92665. Telephone (714) 998-8080.

Beverly Hills High School Computer Club. Contact: Paul Michalisco, 241 Marino, Beverly Hills, Calif. 90212.

Valley Computer Club, Contact: Al Herndon, P.O. Box 6545, Burbank, Calif. 91510. Telephone (213) 842-0912.

Sacramento Microcomputer Users Group (Smug). Contact: Smug, P.O. Box 161513, Sacramento, Calif. 95816. Telephone (916) 381-0335 (Richard Lerseth, newsletter editor).

CANADA

Niagara Area Computer Club, Contact: John Youngquist, Box 122, Fort Erie, Ontario, Canada.

Toronto Region Amateur Computer Enthusiasts. Contact: Harold G. Melanson, Streetsville Post Office, Missauga, Ontario, Canada.

Club d'Informatique de la Mauricie (Ciam). Contact: S. Brousseau, 3795, Jean-Talon, Trois-Rivieres, Quebec G8Y 2G8. Telephone (819) 375-1019.

CONNECTICUT

Bridgeport Area Society for Involved Computerists (Basic). Contact: Basic, Attn: Al Song, 12 Wildwood Drive, Trumbull, Conn. 06611.

Connecticut Microists. Contact: George Ahmuty, 8711 Wendy Lane, Westport, Conn. 06880. Telephone (302) 227-8534.

DELAWARE

Delaware Users of Microprocessor Systems (Dumps). Contact: David Corbishley, 12 Keith St., Kimberton, Newark, Del. 19713. Telephone (302) 737-3367; in New Jersey, telephone (609) 921-3260.

Clubs wishing to be included in this listing should send their names and addresses, as well as the names, addresses and telephone numbers of their contact persons, to Microcomputing Editor, Computerworld, *797 Washington St., Newton, Mass. 02160.*

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Space Coast Microcomputer Club. Contact: Ray O. Lockwood, 315 Inlet Ave., Merritt Island, Fla. 32952. Telephone (305) 452-2159.

South Florida Computer Group. Contact: Bruce Cameron, P.O. Box 236188, Miami, Fla. 33123. Telphone (305) 324-5572.

IDAHO

Pocatello Microcomputer Club. New Contact: Joseph E. Price, Box 8107 (Physics Department), Idaho State University, Pocatello, Idaho. Telephone (208) 236-2350, 232-4462.

ILLINOIS

Cyborg. Contact: Ralph Bargen, 1362 E. 59th St., Chicago, Ill. 60637.

Packard Personal Computing Club. Contact: Jack Stansbeary, c/o Packard Instrument Co., 2200 Warrensville Rd., Downers Grove, Ill. 60515.

Chicago Area Computer Hobbyist Exchange. Contact: Bill Precht, 1102 South Edison St., Lombard, Ill. 60148.

The Peoria Area Computer Club (Pacc). Contact: Anthony M. Drake, 2019 N. Idaho, Peoria, Ill. 61604. Telephone (309) 682-5894.

INDIANA

Louisville Area Computer Club. Contact: Andy Ehalt, 115 Edgemont Drive, New Albany, Ind. 47150.

Hoosier Amateur Computer & Kluge Society. Contact: Ray Borrill, 111 South College Avenue, Bloomington, Ind. 47401.

Valpo Tech Microcomputer Society. Contact: Arthur Hershman, Valpariso Technical Institute, Valpariso, Ind. 46383.

Calumet Computer Tribe. Contact: Ray Seiden, 6825 Ridgeland Ave., Hammond, Ind. 46324.

Indianapolis Small Systems Group. Contact: Mike Sanderson, 2201 West 79th St., Indianapolis, Ind. 46260.

Summit City Computer Club. Contact: Stuart Brown, 3534 South Barr, Ft. Wayne, Ind. 46806.

Evansville Computer Club. Contact: Robert W. Herdink, c/o National Sharedata Corp., P.O. Box 3895, Evansville, Ind. 47737. Telephone (812) 426-2728.

IOWA

Quad City Computer Club. Contact: Larry Woods, 2632 W. 36th St., Davenport, Iowa 52806. Telephone (319) 391-3125.

LOUISIANA

Northwest Louisiana Computer Group. Contact: Michael Murray, P.O. Box 8843, Shreveport, La. 71108. Telephone (318) 635-4643.

Debach Computer Club. The society is at Rt. 3, Box 110, Dubach, La. 71235.

Crescent City Computer Club. New contact: David Hughes, P.O. Box 1097, University of New Orleans, New Orleans, La. 70122. Telephone (504) 271-5440.

MASSACHUSETTS

Greater Boston Computer Group (GBCG). Contact: Vin Moscaritollo, 59 Bellvu Road, West Roxbury, Mass. 02135. Telephone (617) 325-2155.

MICHIGAN

Mid-Michigan Microcomputer Group. Contact: Joyce M. Church, 4307 Mar Moor Drive, Lansing, Mich. 48917. Telephone (517) 321-1587.

Southeastern Michigan Computer Organization. Contact: Jim Rarus, 15377 Veronica, East Detroit, Mich. 48021.

Lansing Microprocessor Club. Contact: Bill Serviss, 13121 Tucker Drive, DeWitt, Mich. 48820.

Mid-Michigan Computer Club. Contact: Tony Preston, 15151 Ripple Drive, Linden, Mich. 48451. Telephone (313) 735-5279.

MINNESOTA

Southeast Minnesota Amateur Computer Society. Contact: J. Michael Anglin, 6912 N.W. 18th Ave., Rochester, Minn. 55901. Telephone (507) 282-9748.

Minnesota Computer Society. Contact: Jean Rice, Box 35317, Minneapolis, Minn. 55435. Telephone (612) 941-1051.

MONTANA

Flathead Computer Society. Contact: E.G. Brooner, P.O. Box 236, Lakeside, Mont. 59922. Telephone (406) 844-3410.

NEBRASKA

Mid-America Computer Hobbyists. Contact: Thomas F. Smith, P.O. Box 13303, Omaha, Neb. 68113. Telephone (402) 294-2202.

NEW YORK

New York Amateur Computer Club. Contact: John Frederick, Box 106, Church St. Station, New York, N.Y. 10007.

Ithaca Computer Group. Contact: S. Edelman, Box 91, Ithaca, N.Y. 14850. Telephone (607) 273-3271.

Westchester-Fairfield Amateur Computer Society. Contact: C.B. Hensley, R.R. 1, Pound Ridge, N.Y. 10576. Telephone (914) 764-4213.

Long Island Computer Association. Contact: Aileen Harrison, 36 Irene Lane East, Plainview, N.Y. 11803. Telephone (516) 938-6769.

NEW MEXICO

Albuquerque Computer Club. Contact: Gary Tack, P.O. Box 866, Corrales, N.M. 87048.

NEW JERSEY

Amateur Computer Group of New Jersey. Contact: Sol Libes, 995 Chimney Ridge, Sprinfield, N.J. 07081. Telephone (201) 2063.

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Northern Nevada Amateur Computer Club. Contact: A. Brady, c/o UNSCC, P.O. Box 9068, Reno, Nev. 89507.

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Triangle Area Computer Club (Tacc). Contact: Ed Comer, 4818 Ferncrest Drive, Greensboro, N.C. 27410. Telephone Andy Pitts (919) 765-1277.

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Southeast Ohio Computer Society. Contact: Dennis Anderson, P.O. Box 67, Cambridge, Ohio 43725.

Dayton Microcomputer Association. Contact: Dave Lundy, 1404 Long Island Court, Xenia, Ohio 45385.

Amateur Computer Society of Ohio. Contact: Fred Hatfield, 1372 Grandview Ave., Columbus, Ohio 43212.

Cleveland Digital Group. Contact: John Tucky, 4006 East 57th Street, Cleveland, Ohio 44105.

Cincinnati Computer Club. Contact: Mike Shebesta, 1838 Fireside Drive, Cincinnati, Ohio 45230.

Computer Hobbyists Around Toledo. Contact: Bill Gensbechler, 2227 Portsmouth Ave., Toledo, Ohio 43612.

OREGON

Oregon Council for Computer Education. Contact: Dick Ricketts, 1200 Highway 99N., Eugene, Ore. 97402. Telephone (503) 689-6500.

OKLAHOMA

Central Oklahoma Computer Association. Contact: Lee Lilly, P.O. Box 2213, Norman, Okla.73070.

Oklahoma City Computer Club. Contact: Bill Cowden, 2412 S.W. 45th, Oklahoma City, Okla. 73119.

PENNSYLVANIA

Central Pennsylvania Computer Club. Contact: Dave Ciemiewicz, 533 N. Holly St., Elizabethtown, Pa. 17022. Telephone (717) 367-6512.

Centre County Computer Club. Contact: Carl Vesper, 1357 E. College Ave. State College, Pa. 16801. Telephone (814) 238-0048.

Pittsburgh Area Computer Club. Contact: Fred Kitman, 216 Beech St., Pittsburgh, Pa. 15218.

TEXAS

Texas A&M University Microcomputer Club. The society can be reached at P.O. Box M-9, College Station, Texas 77844.

Texas Computer Club. Contact: L.G. Walker, Rt. 1, Box 272, Aledo, Texas 76008.

Panhandle Computer Society. Contact: Tex Everett, 2923 Spring, Amarillo, Texas 79103.

Central Texas Computer Society, Contact: Ray D. McCoy, P.O. Box 17303, Austin, Texas 78760.

Microcomputer Tinkers & Bug Busters. Contact: William Peters, 3845 Le Bleu, Beaumont, Texas 77707.

Lamar University Computer Club. Contact: Tim Magnuson, L.U. Box 10996, Beaumont, Texas 77710.

El Paso Computer Group. Contact: Jack O. Coates Jr., 213 Argonaut No. 27, El Paso, Texas 79912.

Computer Hobby Group of North Texas. Contact: Bill Fuller, 2377 Dalworth, No. 157, Grand Prairie, Texas 75050.

Houston Amateur Microcomputer Club. Contact: Cliff Carley, 4506 Woodside, Houston, Texas 77023.

South Texas Computer Club. Contact: Ray Atnip, Suite 125, 11246 S. Post Oak, Houston, Texas 77035.

Permian Basin Computer Group. Contact: John Rabenaldt, P.O. Box 3912, Odessa, Texas 79760.

Northside Computer Group. Contact: Jim Aldridge, 2318 Townbreeze, San Antonio, Texas 78238.

San Antonio Computer Group. The society is located at 7517 Jonquill, San Antonio, Texas 78233.

Nasa-JSC Computer Hobby Group. Contact: Marlowe Cassetti, 1011 Davenport, Seabrook, Texas 77586.

UTAH

Utah Computer Association. Contact: Holly Barney, 1928 S. 2600 East, Salt Lake City, Utah 84108. Telephone (801) 485-3476.

Utah Computer Association. Contact: Holly Barney, 4903 Cottonwood Lane, Holladay, Utah 84117.

VIRGINIA

Tidewater Computer Club. Contact: C. Dawson Yeomans, 677 Lord Dunmore Drive, Virginia Beach, Va. 23462. Telephone (804) 420-6379.

WASHINGTON

Northwest Computer Club. Contact: John Marshall, P.O Box 242, Renton, Wash. 98055. Telephone (206) 226-7775.

WEST VIRGINIA

West Virginia Computer Society. Contact: Bill England, 167 Iroquois Trail, Ona, W. Va. 25545.

WISCONSIN

Durant Computer Club. Contact: Jim White, 901 South 12th St., Watertown, Wis. 55094.

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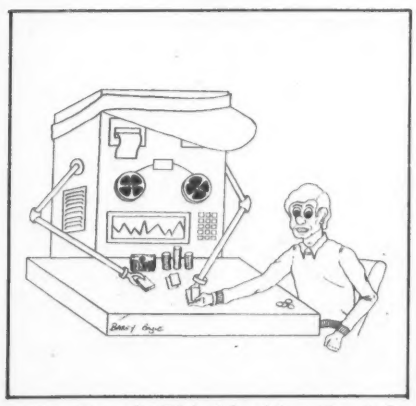

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Industry Analysts Say

IBM Divisions May Become Competitors

By E. Drake Lundell Jr.
CW Staff

IBM is moving toward allowing its major computer manufacturing arms — the Data Processing Division (DPD) and the General Systems Division (GSD) — to invade each other's turf, industry analysts agree.

The strategy, which is called the "contention" or "General Motors" plan, foresees the day when both of these divisions will offer a full range of products that will be direct competitors.

And many industry sources believe that the strategy will become apparent with the introduction of the IBM E series later this year or early in 1979 (see story on Page 1).

Until now, the two divisons have clearly stayed out of each other's way — even though there have been some situations in which GSD equipment has competed with and even replaced DPD equipment.

In general, however, GSD has been assigned the low end of the marketplace, specializing in packaged small business systems such as the System 32 and 34 and the System 3. The Atlanta-based division has also so far had the assignment of penetrating the minicomputer iron area with the Series/1.

The White Plains, N.Y.-based DPD, on the other hand, has concentrated on medium-to large-scale systems from the 370/115 through the Series 30 processors.

The two have come into conflict, however, particularly in distributed data processing applications, and field reports indicated that the Series/1 has proved to be a formidable competitor to the DPD-backed 3790 product line in some applications.

IBM's motivations for such a move toward more intercompany competition are varied, according to the analysts, and range from fear of a possible government-ordered breakup as the result of antitrust cases against the firm to just plain marketing strategy.

Harry Edelson, vice-president with Drexel Burnham Lambert, Inc., noted that in the past, DPD salesmen practically refused to

(Continued on Page 157)

E Series Doesn't Worry PCMs

IBM's plug-compatible CPU competitors aren't worried about the possible effects of IBM's expected E series announcement, feeling that the new series will be more competitive with offerings of the megaminicomputer manufacturers (see story on Page 1).

And some plug-compatible manufacturers (PCMs) noted that IBM's expected system was somewhat of a turnaround in the industry in that IBM would be reacting to the independents and trying to catch up with them — not the other way around.

At Magnuson Systems Corp., for example, Joe Hitt, marketing vice-president, stated that "there will be no effect" on Magnuson, because "we anticipated the E series."

At Itel, Richard Whitcomb, vice-president for market planning and development, said "we're planning to be competitive in that market" and that the firm was "anticipating the E series."

At National CSS, which is marketing a plug-compatible mainframe with its own software, officials said "we can't see the E series as competition," particularly since National CSS does not use IBM software on its system.

A further competitor in the plug-compatible CPU business likewise predicted no effect on his firm's order rates, particularly since "there's plenty of business for everybody in the market."

Almost all of these competitors, however, predicted that the E series would compete more with the megaminis.

'Hurting at Low End'

"IBM is clearly hurting at the low end" — the 370/115 and 370/125 market — a marketing man at National Semiconductor noted, adding that the competition from the megaminis was eating into IBM's base at the low end of its line.

Almost all of the market planners contacted felt that IBM would introducer lower end models of the E series before the upper end models, predicting that the first E models would serve as replacements for the 115

(Continued on Page 156)

Probst Hits U.S. for Slowing R&D

By Marcia Blumenthal
CW Staff

BLUE BELL, Pa. — Lambasting the U.S. for taking its capability to innovate for granted and adopting a complacent attitude toward technology, Gerald G. Probst, group executive vice-president of Sperry Rand Corp., urged that national policy make new commitments to research and development.

Probst, the former president of Univac, made these remarks here recenty in an address to members of the computer and scientific press and to high technology industry consultants during a two-day technology review sponsored by Univac.

The program, an overview of key technological trends for designing computer systems, included sessions on bubble memory, very large scale integration (VLSI), semiconductor technology and voice recognition and response systems.

In his remarks, Probst recalled the positive and supportive public attitude toward R&D spurred by aerospace innovation during the '50s and '60s which resulted in tremendous growth in the computer industry.

In 1951, he pointed out, R&D expenditures were 1% of the gross national product (GNP). By 1964, R&D investment reached 3% of GNP, but really had multiplied 15 times because of the enormous economic growth the country experienced during that period.

In 1969, Probst continued, interest in R&D began to fade. Although inflation gave the superficial appearance of growth, actual R&D investment slipped to 2.2% of GNP in 1977. Because of inflation, R&D expenditures have been basically flat since 1969, he noted.

(Continued on Page 158)

F. Bachrach Photo
Gerald G. Probst

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E Series Doesn't Faze PCMs

(Continued from Page 155)

and 125 and that only later would IBM move the series up to the 138 to 148 class where most of the competitors are clustered.

Itel's Whitcomb said he didn't expect the E announcement this year, however, indicating that early 1979 might be the date for the first machines in the series.

At present, he said, Itel is looking at the market in two ways. First, the firm is working on derivatives of the AS/4 and AS/5 machines — rumored in the industry to be called the AS/3 and AS/2 machines. These would be less expensive then Itel's current offerings and would bring it more firmly into competition in the 370/138 and 370/148 marketplace.

And while "Itel does have a plan to take on the E series" at the lower end (the 307/115 and 125 class of machines) it will not use derivatives of the AS architecture for this market, he indicated.

IBM will probably use a 32- or 36-bit bus in its E series, Whitcomb said, in part from the Series/1 architecture. He noted that a similar bus architecture was being explored at Itel for its entry into that market.

However, he emphasized that this was only one of several architectures under consideration, indicating that a cost-reduced system similar to the 370/125 might be an effective competitor in the low-end marketplace.

In addition, he said IBM was probably also exploring that option as well as the bus-type architecture since it seems to have two development efforts under way for the E series.

Magnuson's Hitt indicated that with the firm's "strategic architecture" in its machines, it would be in a good position to handle any expected IBM offerings at the low end.

"We can easily move down if we want," Hitt said, indicating, however, that the firm did not know yet whether it wanted to enter that low-end marketplace.

"We want to see the price" of the E series, he said, but added that "it's not really the market we want to be in for awhile."

Right now, he said, Magnuson is concentrating on getting up and running in its present 138 to 148 marketplace, adding that the backlog is increasing on a daily basis.

With the flexible architecture of the Magnuson system, however, he indicated that the firm might decide to offer systems emulating Honeywell Information Systems, Inc. or Univac machines before going into the low end of the IBM markeplace. In addition, he said the architecture would allow the firm to make 3705- and 3790-type devices to sell to the IBM base if it decided to take that tack.

At present, though, he said no decisions have been made for the firm's next marketing thrust.

National CSS Perspective

At National CSS, company officials were careful to point out that they were not just in the plug-compatible CPu market in that they market a total system with their own operating system, unlike the others which rely on using the IBM operating system.

The firm, which said order rates were running ahead of expectations, said it would be the only firm unaffected if IBM put more of the operating system in firmware since it does not rely on the IBM software.

At National Semiconductor, one marketing man expressed his own opinion that the E might be delayed.

"IBM traditionally likes to announce around Labor Day," he noted, "or at the first of the year. I don't think the machine will be ready for Labor Day, and perhaps not at the first of the year."

He said in any case the firm would probably have extremely long delivery schedules, leaving a lot of the market ripe for the independents.

Telenet Adds Offices

WASHINGTON, D.C. — Telenet Communications Corp. recently expanded its field marketing activities, opening three new district offices and adding 20 marketing representatives and systems engineering support personnel.

The company also established a Federal Government Operations Group in Arlington, Va., which will be headed by Lee Stiehl.

Federal agencies' specialized procurement procedures and wide-ranging equipment and application needs prompted the establishment of the new group, a company spokeswoman said.

Expansion in district office operations, the spokeswoman explained, was spurred by service requests from Telenet's current 200-company customer base and the present inability of sales people to respond to inquiries from prospective customers.

The three new district offices are located in Houston, Detroit and Cherry Hill, N.J.

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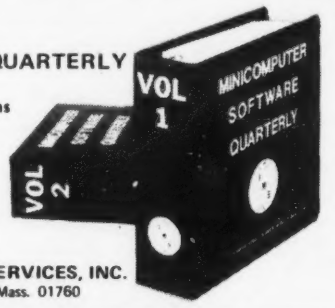

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IBM Divisions Soon to Compete, Analysts Say

(Continued from Page 155)
cooperate with GSD salesmen and that, even though IBM started offering double commissions — one for the GSD and one for DPD — on joint sales, DPD personnel are "still not happy about cooperating."

Because of this, the GSD people want to be able to move their base of smaller computer users up to larger systems and not have to cooperate with DPD on such moves, he indicated.

At the same time, Edelson said the IBM strategy is to foster competition between the two groups, particularly in the megamini area, because the firm feels such competition will affect IBM less than it will other firms in the business.

At present, Edelson noted that IBM has only about a 5% share of the minicomputer market and he said the firm could grow at a rate of 40% to 50% per year in this area for 10 years without worrying about antitrust implications.

At the same time, analysts note that the megamini manufacturers are moving more and more into IBM's turf with systems that can compete with the low end of the 370 line.

Gideon Gardner, vice-president at Oppenheimer and Co., Inc., agree that IBM's E series announcements will be intentionally made to impact the business of GSD and indicated that the IBM strategy over the next few years will be to make the divisions as autonomous as possible.

Benefit to Stockholders

Both analysts indicated that the move could be under way because of antitrust worries on the part of IBM and noted that IBM could offer to voluntarily break itself up in order to settle the government's case against it.

With both divisions capable of competing across a broad front, they said, the move would be good for the stockholders, who would receive shares in each of the new companies under such a breakup plan.

William Easterbrook, vice-president specializing in computers in Kidder, Peabody and Co.'s research department, agreed, noting that such a divestiture would hurt other firms in the business far more than it would damage IBM.

Backing up this contention, James Peacock, a vice-president at International Data Corp., noted that GSD alone would already be twice the size of Digital Equipment Corp., which is the largest of the separate minicomputer makers.

In total — counting minis and small business systems — he estimated GSD has an annual volume of at least $2 billion world-wide, making it twice as large as DEC.

Peacock placed IBM's present share of the mini market at around 3%, not counting the small business systems market, but predicted that share would grow to around 15% to 20% by 1982 even if IBM does not puruse a contention strategy.

However, he added, he would probably tack on a few percentage points more if IBM did pursue that course.

Robert Fertig, vice-president in charge of the Technology Analysis Group at Advanced Computer Techniques Corp., echoed the others' feelings that such a move might be made for antitrust considerations, but added that it also might be the best way for IBM to achieve growth in the 1980s.

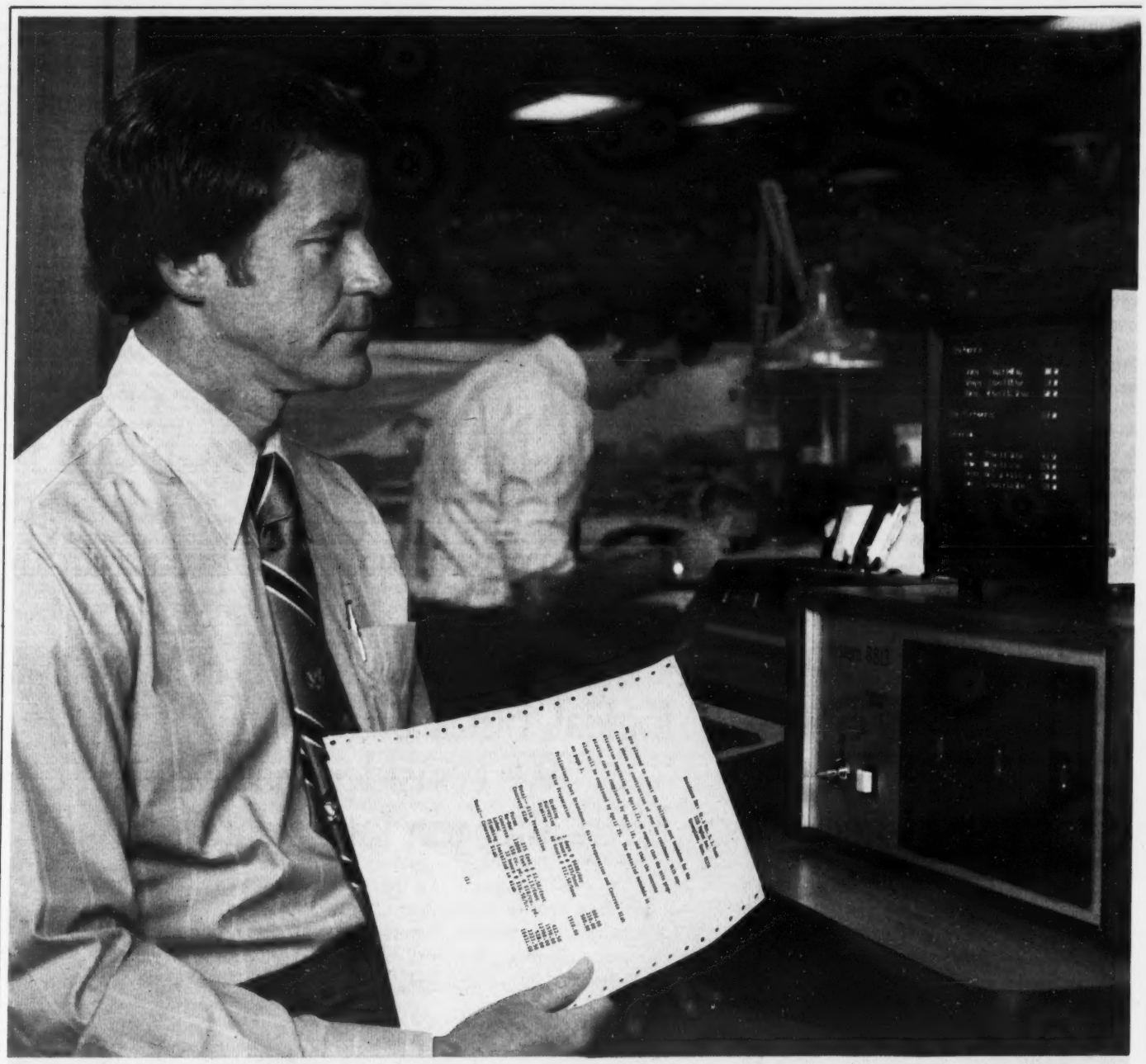
Using the General Motors analogy, he said GM doesn't care whether Chevrolet or Oldsmobile sells the car, just as long as Ford does not.

Open competition between the two groups is a way to help ensure that the business is kept within IBM, he said, and does not fall into competitors' hands.

He also noted that if IBM did decide to voluntarily split itself up for antitrust reasons, it would be in the interests of the shareholders for each divison to have a complete product line to offer its users.

Correction

In "Cross Took ICL Through 'Awe-Inspiring' Years" [CW, May 8], statements indicated that Cross received tax repayments that were illegal and were known to be by International Computers Ltd. and the British Inland Revenue Department. Those statements were untrue. *Computerworld* regrets the error.



The Computer for the Professional

The 8813 was built with you, the professional, in mind. It quickly and easily processes cost estimates, payrolls, accounts, inventory, patient/client records and much more. You can write reports, briefs, and proposals on the 8813's typewriter keyboard, see them on the video screen, and instantly correct, revise, or print them.

Using the 8813, one person can process what would normally require many secretaries, several bookkeepers, and a great deal of *time*. And data storage takes a small fraction of the *space* used by previous methods.

You don't need to learn complicated computer languages. The 8813 understands commands in English. If you want to write your own programs, the 8813 includes a simple computer language, BASIC, that you can master in a few days. The 8813 slashes the professional's overhead. It's a powerful time and money-saving ally. Prices for complete systems including printer start at less than $8,000.

See the 8813 at your local dealer or contact PolyMorphic Systems, 460 Ward Drive, Santa Barbara, California, 93111, (805) 967-0468, for the name of the dealer nearest you.

PolyMorphic Systems

Univac Manager Says

Semi Maker, Computer Firm Line Blurring

BLUE BELL, Pa. — A shakeout in the semiconductor industry is underway, and somewhere down the road there will be no difference between a semiconductor manufacturer and a computer manufacturer, according to Theodore Malanczuk, group manager for semiconductor processing at Univac.

Speaking here during a recent technology review held by Univac, Malanczuk noted that the company opened a semiconductor facility two years ago. Although Univac was one of the last mainframers to incorporate semiconductor capability, the major reason for making the move was to aid in developing large scale and very large scale integrated technology.

Semiconductor vendors have tended to remain static, relying principally on high-volume production, Malanczuk asserted, adding that Univac found that semiconductor makers were not interested in fabricating specialized circuitry. In addition, by simultaneously addressing semiconductor and computer technology, the company could maintain technological superiority and protect proprietary innovation.

Malanczuk is not alone in his observations of this phenomenon. Recently National Semiconductor Corp. announced a new computer and revealed it would sell computer products directly to end users [CW, May 8].

Although National Semi will be competing directly with some of its own customers, Pierre Lamond, the firm's director of technology development, summarized the situation as follows: "The semiconductor devices we are making are no longer components, but systems on a single chip. The dividing line between the component and the system is rapidly disappearing."

Probst Faults Slowdown In U.S. Technology R&D

(Continued from Page 155)

Inflation was only one of several factors Probst blamed for R&D slippage. Government cutbacks in lunar exploration and slashes in R&D expenditures, convenient ways to obtain short-term savings in the national budget, have resulted in detrimental long-range effects, Probst observed.

In addition, the Accounting and Principles Board no longer allows R&D to be carried as a balance sheet item, but it must be expensed in the year spent, Probst said. "The post-Vietnam era," he added, "has shown an upswelling of sentiment against technological innovation."

Probst warned that if the current trend continues, the U.S. may fall behind other countries, particulary Japan with its strong commitment to VLSI systems. Citing recent statistics, Probst noted that the U.S. now has 25 scientists per 10,000 population while Japan is edging up with 22 for every 10,000 and West Germany with 18 for every 10,000.

Asks Policymakers' Aid

Probst called on national policymakers to assist private industry in bringing the R&D commitment back to 3% of GNP by stimulating the investment in high technology.

Special incentives such as investment tax credits for R&D and the elimination of double taxes on dividends are some advantages Probst cited as stimulants for companies to increase R&D expenditures as well as the creation of venture capital for small high technology companies.

During the various sessions, Univac researchers and managers supported Probst's emphasis on the commitment to technology. They predicted that VLSI technology will have a profound impact on the computer industry and indicated that the company was actively developing VLSI to remain competitive with Japanese manufacturers already highly committed to this technology.

The semiconductor industry is one area already impacted by VLSI, according to the group manager of semiconductor processing, who also predicted a major shakeout in the semiconductor industry.

While the end user views lower cost as the major advantage of technology, Dr. Barry Borgerson, director of research and technical planning, pointed to higher reliability and greater security as important technological advances.

However, Borgerson noted that researchers could not confidently predict the advantages of new techniques beyond a five-year period.

But it appears, from what Univac researchers said, that as more sophisticated technologies such as dialogue processing and voice recognition and response are developed and become widely available, nonprogrammers will easily be able to use systems resulting in more applications, and continued industry growth.

"National Semiconductor is crossing the Rubicon.

We are entering the computer market with a range of sophisticated system-level products.

I think they are some of the most important breakthroughs ever in systems technology.

For us, this step is not only natural and logical, but inevitable.

We consider that we are finally giving birth after ten long years."

Charles E. Sporck
President

"I assure you, National Semiconductor did not caper into the computer market on a whim. For the past decade, we've been a leader in creating the technology that makes computers work.

In 1973, we became a visible systems supplier—with the sale of electronic point of sale systems. We're now the second largest supplier in the world. With more than 13,000 terminals and over 1000 computers in more than 1,400 store sites. And a full-time field service force of more than 250 people.

Three years ago, we introduced IBM 370-compatible add-on memory. Today, National ships more large scale 370 add-ons than anyone except IBM.

National has built add-in memories for some of the most popular minicomputer models as well.

We are now shipping our industry standard Series/80 microcomputers at the rate of 12,000 systems a year.

Two years ago, we unveiled our first IBM-compatible computer. To date, over 100 systems have been installed in ten

McDonnell Douglas Merger at Issue

Canadian Firm Still in the Air Over Data 100

By Marcia Blumenthal
CW Staff

MONTREAL — Northern Telecom Ltd., which owns 31% of Data Corp.'s outstanding common stock, still has not adopted an official position on the proposed merger of Data 100 with McDonnell Douglas Corp.

But Richard W. Wertheim, Northern Telecom's manager of investor relations, told *Computerworld* the proposed merger was discussed at some legnth during Northern Telecom's monthly board meeting here May 25. Many Data 100 shareholders have been seeking Northern Telecom's leadership in the final vote, he said, which is expected to take within 70 to 90 days.

According to Wertheim, there is no need for Northern Telecom to take a position at this time since there is only an agreement in principle between Data 100 and McDonnell Douglas.

Northern Telecom's final decision will be affected by whether the company considers McDonnell Douglas' stock or cash offer sufficient and by tax rulings by the Internal Revenue Service (IRS).

Asked if Northern Telecom would make a counteroffer, Wertheim replied, "Until we accept the offer, all things are possible."

Data 100 accepted McDonnell Douglas' offer because its growth rate outstripped its ability to finance that growth, a company official said. The company said it was a very expensive process to maintain a rental base and still be able to invest in research and development, as it had in the past.

Vicious Circle

By being frequently forced to seek capital in the equity market, Data 100 had to show improved earnings in order to raise more capital. This, according to a company official, created a vicious circle and resulted in reductions in the amount of money that could be used for R&D.

McDonnell Douglas has given Data 100 the commitment to help it grow at the rate Data 100 considers desirable, the official said. The company would be run as a wholly owned subsidiary, and no changes in the current management are expected, he added.

The merger is subject to approvals by the directors and shareholders of both companies and the receipt of a favorable tax ruling by the IRS.

Data 100 said it does not anticipate any difficulty with the finalization of the merger, but noted Northern Telecom could be a threat because it has an option to purchase another 400,000 shares of common stock. Such a purchase would bring its holdings to two million shares, or 35% of Data 100's outstanding shares on a fully diluted basis.

Under the terms of the merger agreement, Data 100 common shareholders would be offered a choice of McDonnell Douglas nondividend-paying preferred stock or cash. The preferred stock would be offered on a one-for-one basis, convertible to McDonnell Douglas common stock at a specified rate within 12 to 24 months of the merger.

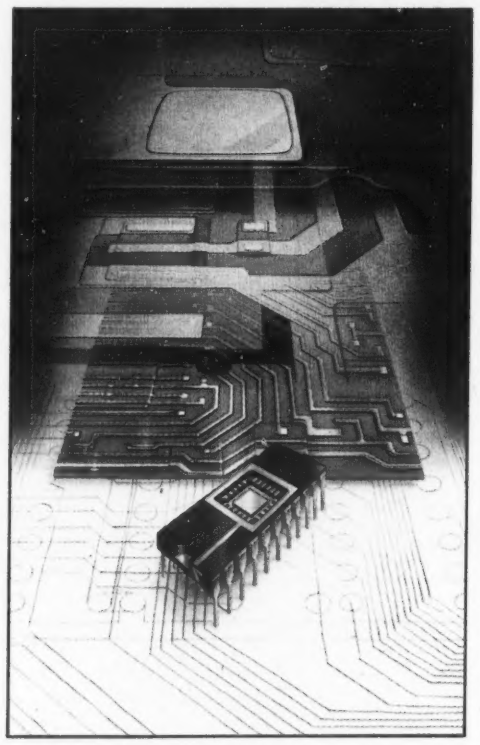
In any case, no more than 49% of the value of Data 100's common and preferred shares could be purchased by McDonnell Douglas for cash so the securities could be tax-free to shareholders electing the offer of McDonnell Douglas preferred stock.

countries. We are now shipping more IBM-compatible computers than all other competitors combined.

I think this demonstrates that National Semiconductor has quietly, deliberately become a prime mover in computer hardware and systems. Annual computer revenues already put us in the top 15 of all U.S. general purpose computer manufacturers—and we're climbing. Certainly, we haven't come this far without being acutely aware of the market's needs.

A clear, levelheaded look.

If we had not penetrated the systems market of our own accord, technology would have eventually forced the business on us. Our semiconductor components are rapidly becoming total "systems on a chip."



But before jumping into the market altogether, we gave ourselves the luxury of a clear, levelheaded look at the terrain.

Because we have no equity in particular methodology or design, we remain free to appraise the market and develop a product that uniquely solves a problem.

And, by applying current semiconductor technology and production expertise, we deliver better performance at a lower price than other suppliers.

Just another computer?

National Semiconductor is deeply committed to applying its systems technology to real user problems. We are not interested in simply creating another different computer.

By making software-compatible hardware, we protect a customer's investment in standardized software.

At the same time, we consider it our responsibility to supply our customers with the latest in systems technology. So we'll be sparking unique product advances of our own. Particularly where a void exists in the marketplace.

For keeps.

National Semiconductor is in the computer systems business for keeps—as a broadbase supplier able to handle everything from manufacture through distribution, delivery, service and support. That's why we have an active, full-fledged service force of over 250 people set up to respond to customer needs.

We're willing to pinpoint our experience in research and development to further advance systems technology. In fact, over the next several months we'll be taking the wraps off some of the most significant new products in our history. Breakthrough products like the System/400, perhaps our most important advance in systems technology to date.

The System/400 is the first minicomputer designed to perform all the functions of large IBM computers. It means users will be able to run existing industry-standard software on a system at a fraction of the cost of a large computer.

If you'd like to know more about the future of National Semiconductor, Computer Products, or about System/400 specifically, write me personally: Charlie Sporck, President, National Semiconductor Corporation, Drawer 1, 2900 Semiconductor Drive, Santa Clara, California 95051."

Computer Products Group
National Semiconductor Corporation

Foreign Orders & Installations

The Gewerbedasse Bank of Berne, Switzerland, has ordered an NCR Corp. V-8550 and 31 NCR terminals.

A Univac 1100/11 valued at $3 million has been ordered by the Department of Public Health in Canton Aargau, Switzerland.

The Regional Computer Center of Aarhus University, Denmark, has ordered Dissipla graphics software systems from Integrated Software Systems Corp. The system will be used for a variety of scientific and statistical programs.

A $4.6 million order for computer equipment has been awarded by the Yugoslav State Bank to Progres, the general agent in Yugoslavia for Honeywell Information Systems Italia.

Norsk Hydro of Norway has acquired three Univac systems valued at approximately $4 million from Saab Univac Norge A/S. The systems consist of an 1100/12, an 1100/11 and a 90/30.

Three French companies have acquired Univac 90/60 systems with a total value of more than $4 million. The companies are Establishments Bragard of Epinal, Metra International of Montrouge and Groupe Sud Ouest, Bordeaux.

The UK has agreed in principle to acquire a one million word Cray-1 system from Cray Research, Inc. to be installed at the Ministry of Defense during 1979. The value of the system is approximately $9 million.

CI Notes

Auditors Silent On Scan-Data

NORRISTOWN, Pa. — Scan-Data Corp. has reported its auditing firm, Arthur Anderson & Co., is withholding opinion on the company's 1977 financial statements until Scan-Data finalizes its business arrangements with Control Data Corp.

To date, the two corporations have only agreed in principle to enter into certain business arrangements, with CDC making a minority investment in Scan-Data. The final agreement is subject to the resolution of significant contingencies, Scan-Data said.

Scan-Data's losses of $976,000 in 1977 and $1.3 million in 1976, adverse factors affecting the company's financial position and the unsettled business arrangement with CDC were the reasons the auditing firm gave for withholding opinion.

Perkin-Elmer Revamps Its Data Systems Group

TINTON FALLS, N.J. — Perkin-Elmer Corp. has decentralized its Data Systems Group, assigning separate sales and marketing functions to each of the three divisions comprising the group — Interdata, Wangco and terminals.

The arrangement essentially reflects the group's organization prior to Daniel Sinnott's tenure as Data Systems Group general manager. Sinnott, who resigned suddenly May 17, has been succeeded by William W. Chorske, formerly deputy general manager of Perkin-Elmer's Instrument Group.

The centralized sales and marketing operation created what one company official called an "artificial barrier" between the company and its customers.

The company has retained a centralized sales and service division for its international market, he noted.

Siemens Claims 15% Of W. Europe Micros

MUNICH — Siemens Corp. has captured a 15% share of the western European microcomputer market, according to a spokesman.

Siemens does not market its microcomputers in the U.S. because it has licensing agreements or joint ventures with two American companies. It is a primary source for Intel Corp. and has a marketing arrangement with Advanced Micro Devices of Sunnyvale, Calif.

Siemens market researchers projected the worldwide integrated circuit market would nearly double in the next four years from about $38.5 million to about $73.1 million with the microprocessor portion expected to bounce up by more than 200%, accounting for about $9.75 million by 1981.

Customized single-chip computers will also be produced by Siemens to perform control functions in consumer products such as radio and television sets and washing machines.

Nickels & Dimes

The board of directors of **Electronic Memories and Magnetics Corp.** voted to pay a quarterly cash dividend of 25 cents a share, payable June 10, on its $1 cumulative convertible preferred stock.

$ $ $

A 42% increase in **Itel Corp.'s** regular quarterly cash dividend on its common stock was approved by the board of directors. Payable Aug. 18, the quarterly dividend is now 16 cents a share.

$ $ $

The board of **Automatic Data Processing, Inc.** voted to increase the quarterly dividend from 10 cents to 13 cents a share, payable July 1.

$ $ $

Computer Devices, Inc. has negotiated a new line of credit for up to $8 million, of which $4 million will be available from the New England Merchants National Bank of Boston for lease financing and working capital. The remainder will come from U.S. Portfolio Leasing for computer terminal leasing.

$ $ $

Network Systems Corp. has arranged for the private financing of $1.9 million from a group of venture capital firms and five private investors. The funds will be used to increase working capital and increase production of the company's Hyperchannel product line.

The Outer Limits of Distributed Data Processing.

Portable terminals extend data's point of entry far beyond your perimeter of stationary workstations. Even in the most sophisticated distributed networks, source data is still being manually transcribed at the source and then physically carried to the operator of a key-entry installation. Using MSI's portable terminals, the data can be entered at the source by the people who are already working there.

Meeting the challenge of increasingly more complex data handling jobs and ever-larger data volumes, MSI's new family of portable terminals provide a broad range of functional capabilities:
4K to 48K words of CMOS segmentable memory, both key entry and optical wand scanning of various numerical bar codes, throwaway-batteries, asynchronous communications, and both LED and LCD displays. And because MSI's terminals are user-programmable, each terminal can be parameterized to suit its particular application and its working environment at the outermost reaches of source data entry.

For further information please write to William B. Patton, Vice President-Marketing.

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Process Control Systems Seen Proving Success

WELLESLEY, Mass. — Computerized data acquisition and control systems have been successful in penetrating the process industries and improving plant efficiency, according to a recent survey released here by Venture Development Corp. (VDC).

In the next five years, the total investment in sensor-based data acquisition and control systems will more than double, topping $5 billion compared with the 1977 investment of $2.2 billion, according to VDC senior consultant Maurice Klapfish.

The industry segments with the highest system expenditures in 1977, Klapfish pointed out, were the electric power, chemical processing, pulp and paper and petroleum refining industries, accounting for 63.1% of the total investment.

Enhanced Return

In recent years, the return-on-investment for these systems has been enhanced by the prospect of saving 1% to 2% on energy and raw materials as well as a reduction in scrap, the report noted.

While the cost of data acquisition hardware is declining, the savings is offset by the trend toward production of larger, sophisticated systems with more sensor points and new features such as multicolor CRTs, which, according to the survey, will increase the cost of these systems.

The report, entitled "Sensor-Based Data Acquisition and Control Systems in the Process Industries," provides data on installed base, current consumption and projected installations through 1983 for each of the key process industries.

Part of a three-volume set, the report costs $1,500 and is available from VDC at One Washington Street, Wellesley, Mass. 02181.

Tymshare Affiliate Opens

Tymshare's Inc.'s Japanese affiliate, Kokusai Tymshare, Ltd., began offering services in Tokyo. Tymshare also reported that Bernard Goldstein, senior vice-president and board member, has resigned as of May 18.

Now you don't have to buy from an unknown to get a good printer deal for your mini.

Some people still believe that the only way they can save a bundle is by going to that little printer outfit down the alley. Not true, even though their salesman tells you you'll pay more for a famous label.

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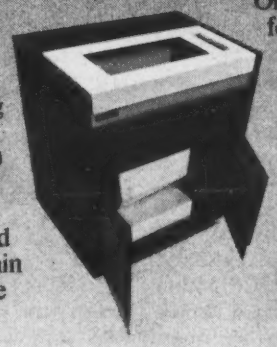
We have a complete line designed specially for DEC,® Hewlett-Packard (including the HP 3000), Interdata,® Data General and IBM systems. A choice of 300, 600 and 1000 LPM printers. Models that buy you much more than the line speeds you want. Things like 30-day delivery. Nationwide service and spare parts whenever you need them—within two hours or less. Plus standard features the others sell you as options: an advanced chaintrain design that eliminates the wavy lines of drum printers. Full buffering to free up your CPU for processing between printer line settings. Six clear copies and paper-status sensors. And our printers are plug-compatible so you won't have to change your software.



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Sees Annual Sales Jumping 35%

PCC: DDP Growing Faster Than Anticipated

SAN FRANCISCO — Distributed data processing (DDP) is growing far faster than industry experts anticipated and by 1988 will eventually represent half of the total hardware dollars spent on DP in the U.S., Allen Lay, senior vice-president of Pertec Computer Corp. (PCC), recently predicted.

Speaking at the American Institute of Industrial Engineers' conference here, Lay said "companies which are supplying the products for DDP systems are coming from a host of directions, each with a different strength. The minicomputer people stress hardware flexibility. The terminal and remote job entry people stress communications and networking capability. Data entry producers stress system flexibility and operator-oriented turnkey software."

Hardware Expenditures

Expenditures for DDP hardware are expected to increase at the rate of 35% per year, about double the growth rate of the total DP market, Lay observed.

The demand for DDP is coming from users — not manufacturers — and being propelled by advertising and education, the PCC executive noted. The general population is now familiar with the use of computers through reservation systems, bank teller stations and retail point-of-sale equipment.

Growing familiarity with computers and the acceleration of technology which makes such systems more economical and efficient are both contributing to the earlier-than-expected growth of DDP, Lay indicated.

The technologies under development today assure a steady stream of new hardware offerings in the future. During the next five years, Lay predicted users will seek more variations in terminals and substations and a wider range of compatible products that exhibit more modularity.

OUTPERFORM A PDP 11/70 FOR $4,850

Yep. Given the same disks, memory and terminal load, a PDP-11/34 RSTS/E with GIANT/11 and BASIC PLUS can outperform a PDP-11/70 RSTS/E with RMS-11 and BASIC PLUS II.

And the one-time $4,850 license fee for GIANT/11 gives you DEMAND REPORTING.

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Contracts

Raytheon Data Systems Co. has been awarded a contract to install more than 200 PTS-100 terminals for the Safeco Insurance Companies. The contract is valued at close to $1 million.

Bunker Ramo Corp. has received a $927,000 contract from the Air Force Electronic Systems Division's Spacetrack System Program Office for equipment to record and store data on all man-made objects orbiting the earth.

Datatrol, Inc. has received orders totalling more than $3,344,000 for two retail point-of-sale terminal systems and six retail credit authorization systems.

General Robotics Corp. has signed a one-year, $1.2 million contract to supply systems to Computerservices Division International of Breda, Holland.

Burroughs Corp. has received an order valued at $18 million for the purchase of 3,500 modular transaction control systems to be installed by the UK's Trustee Savings Bank Computer Services, Ltd.

Integrated Software Systems Corp. has been awarded a contract from the Regional Environmental Assessment Program, Bismarck, N. Dakota, for its Dissipla computer graphics software system.

Univac has been awarded a contract for a large-scale system by the headquarters of the National Oceanic and Atmospheric Administration in Rockville, Md. The contract is valued at more than $9 million for the Univac 1100/42 system, which will be enlarged to an 1100/43 in the second year of the contract.

Microdata Corp. has received an order for approximately $3.5 million from Display Data Corp. In addition, Microdata and Display Data have entered into a license agreement for Display Data to manufacture the 1600/30 system in which Microdata will receive royalties over the next several years.

Raytheon Co. has received a $3.5 million Army contract for Patriot antiaircraft missile test facilities.

Computer Sciences Corp. has received a follow-on contract from the Naval Air Development Center, Warminster, Pa., for engineering, analysis and related services support. The one-year, $2.9 million contract contains options for two one-year extensions and is valued at $9.4 million over the full three-year period.

Computer Devices, Inc. has signed a multiyear, 3,000-unit OEM printer contract with National Semiconductor Corp.

Zentec Corp. has received a 500-unit order for its ZMS50 intelligent terminal from Dymo Graphic Systems. These units will be utilized as reporter terminals for newsroom entry of stories.

ATO Systems Management Group has been selected by Honeywell Information Systems, Inc. to create a software system to meet the management information requirements of a major Honeywell client, Fairchild Republic Co. The contract is valued at approximately $2 million.

Orders & Installations

Volume Shoe Corp. has ordered electronic point-of-sale equipment from NCR Corp. valued at approximately $3 million. The equipment includes 600 NCR 2140 electronic cash registers as well as associated communications and computer equipment.

Laker Airways has ordered a System Ten 220 from ICL, Inc. to be installed at Laker's Rego Park, N.Y., Travel Center with terminals at Kennedy and Los Angeles International airports. It will handle ticketing and passenger listings for the airline.

The Beckley Candy Co., a nationwide wholesaler of school supplies, has ordered four Honeywell Information Systems, Inc. Level 6 minicomputers to expedite order entry. The total value of the minicomputers is $120,000.

The Land Bank National Data Processing Center of Omaha, Neb., has installed a Burroughs B4800 system. The system and peripheral equipment is valued at $900,000.

Pepsi-Cola Bottling Co. of Omaha, Neb., has ordered a Univac 90/25 system.

The County of Delaware, Pa., has installed a Burroughs B800 system and a B4800 system in the courthouse, located in Media, Pa.

Neapco, Inc., a Pennsylvania manufacturer of power transmission equipment, has installed a Univac 90/30 system for manufacturing control, order entry and financial applications.

University Computing Co. has expanded its IBM services with the installation of an IBM 370/158 in its Dallas computing center.

ICL, Inc. has won an order for a 2903 system with the Federation of American Societies for Experimental Biology based in Washington, D.C.

First National Bank of San Jose, Calif., has leased an Amdahl Corp. 470 system to Chrysler Corp.'s Parts and Supply Division. The cost of the system was $3,249,000.

McDonald Products of Buffalo, N.Y., has ordered a Univac 90/30 system to expedite the firm's business operations.

Precision Systems, a St. Louis computer service bureau and systems house, has ordered 20 Honeywell Level 6 minicomputers.

The University of Rhode Island at Kingston has installed CLSI's Libs 100 system for automated circulation control in its library.

Pertec Reprimands Tally For 'Unwise Legal Actions'

CHICAGO — The management of Pertec Computer Corp. (PCC) has suggested that Tally Corp.'s board of directors and management focus their attention on day-to-day operations rather than on what it termed "unwise and unfounded legal actions."

Speaking at Tally's annual shareholders meeting here recently, PCC's senior vice-president, B. Allen Lay, said the Tally board probably overreacted in initiating a lawsuit alleging security violations after PCC, which holds about 16% of Tally's common stock, submitted an offer to combine the two companies in exchange for common stock.

The Tally suit resulted in ACP, Inc., a wholly owned subsidiary of PCC, filing a claim for damages and a derivative action in the Federal District Court of Seattle, Wash.

ACP's suit charges Tally failed to disclose that a 10 cents a share extraordinary dividend declared March 17 jeopardized its working capital position, necessitating borrowing and incurring interest which would not have been required if the dividend had not been approved.

As a result of PCC's concern for the financial performance of Tally, Dann V. Angeloff, a Los Angeles-based financial advisor previously nominated by ACP, was elected during the annual meeting to serve on Tally's board.

Lay called on Tally to reconsider the dividend and added, "It is clear at this time that PCC will not reinstate its recent offer for the balance of the Tally shares."

Financial News

Revenues Grow 28% at Data 100

MINNEAPOLIS — Data 100 Corp. reported revenues of $36.9 million for the first quarter, a 28% increase over the $28.9 million reported in the same period a year ago.

Earnings reached $1.4 million or 22 cents a share compared with $1.2 million or 27 cents a share in the year-ago quarter.

The reduced earnings per share for the first quarter reflected an increase of three million shares in the number of common shares outstanding, the firm said.

Edward D. Orenstein, president of Data 100, noted rental revenues increased by 12% and service revenues climbed 39% compared with the same period a year ago.

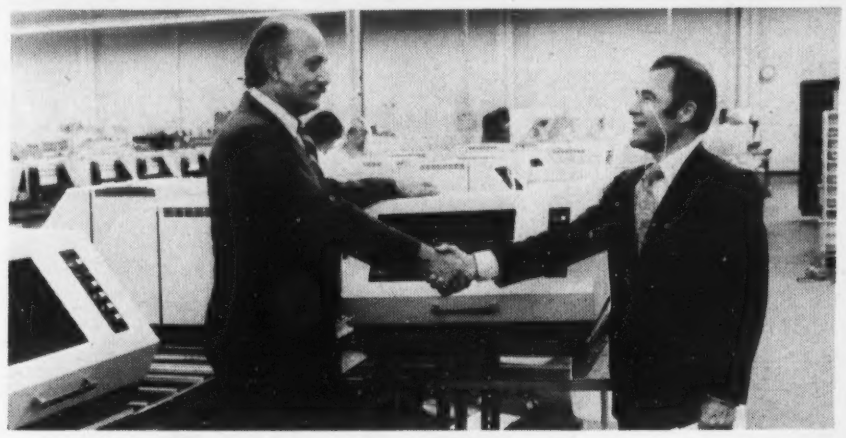
First-quarter expenses reflected a 40% increase in research and development expenditures.

Modcomp Posts Tripled Earnings

FORT LAUDERDALE, Fla. — Modular Computer Systems, Inc. (Modcomp) tripled its net income for the first quarter.

Earnings topped $1.1 million or 32 cents a share on revenues of $14.7 million compared with year-ago first-quarter earnings of $343,000 or 11 cents a share on revenues of $12.2 million.

Commenting on the tripled earnings, A.W. Giles Jr., senior vice-president of finance, pointed to several strategies the firm instituted to improve profits, including raising prices; screening customer orders more closely; reorganizing and streamlining the management structure; reducing the costs of manufacturing; and terminating Modcomp Business Systems, a money-losing subsidiary.



Printronix Milestone

Mel Posin (left), senior vice-president for marketing, and Robert Kleist, president of Printronix, Inc., congratulate each other as the 5,000th Printronix printer rolls off the assembly line at the Irvine, Calif. plant. The company, which manufactures 150- and 300 line/min raster matrix impact printers, plans to introduce a 600 line/min model at the National Computer Conference this week.

Output today.... Outgrown tomorrow!

The technology of computer output equipment is changing — and fast. Where there were once only punched cards and paper, there are now a wide range of devices designed to expedite the output process. *Computerworld* will be taking a close look at these and other related topics in our June 26th Supplement entitled: *Computer Output Equipment*.

Edited by Tim Scannell, *Computer Output Equipment* will be focusing on ways to cut output costs, with tutorial and applications stories on the latest equipment and systems, including:

- Off line printers
- Interactive printer terminals
- Microfilm
- Microfiche
- High speed non-impact printers

If you want to stay up to date on the state of output, don't miss this June 26th Special Report.

If you're marketing computer output equipment or services — call your *Computerworld* sales representative. He can give you all the details and special assistance in ad planning. Or, to reserve space, call Terry Williams at (617) 965-5800. Closing date is June 9th.

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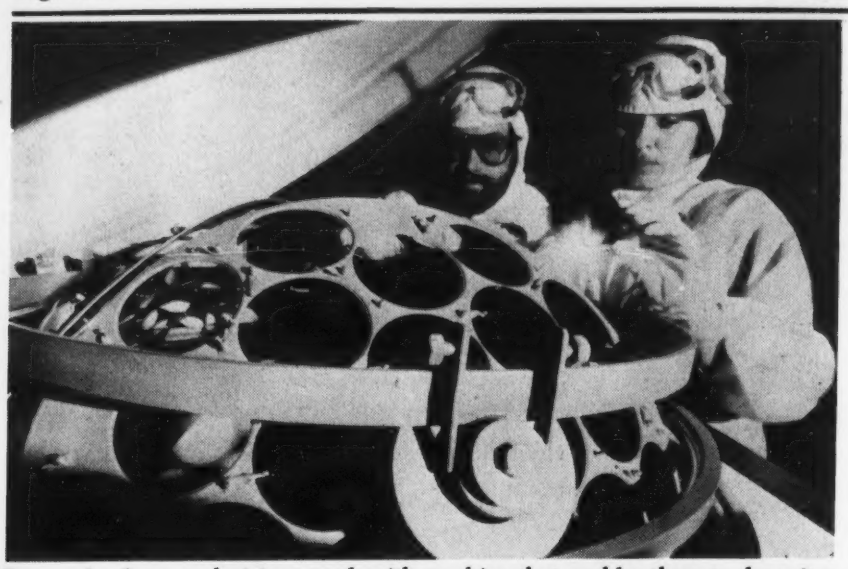


Burroughs Corp. technicians work with machine that enables them to deposit a layer of conductive metal .00004 in. thick on a wafer of silicon. Used on Burroughs' B6800 computers, these memory circuits, no bigger than an aspirin tablet, contain 100 times more components than the circuitry in a television set.

Executive Corner

• Robert Freischlag has been appointed to the newly created position of vice-president, marketing, at Fujitsu America, Inc.

• Geno P. Tolari has been named vice-president, government operations, for Informatics, Inc.'s PMI Western division.

• Roy C. Wood has been promoted to vice-president of education and documentation for Software AG of North America.

• Augustus R. Wagner has been appointed to the post of assistant vice-president of systems for Electronic Tabulating Corp.

• Robert H. Raquet has been elected vice-president, operations, at Decision Data Computer Corp.

• Joseph G. Degen has been elected secretary by the board of Datapoint Corp. Degen is senior vice-president, finance. Also at Datapoint, Thomas J. Howard has been named to the corporate staff position of director, corporate development.

• Donald D. Pagan has been promoted to the new position of vice-president and general manager, customer services division, at Microdata Corp.

• Peter S. Linder has been elected president and a director of newly formed American Interactive, Inc.

• Frederick P. Schmidt has been named a division vice-president at Fairchild Camera and Instrument Corp.

• Gerald F. Olsen has been named vice-president, finance, for Switchcraft, Inc. of Chicago.

• Lee W. Spitler has been elected an executive vice-president of Charter New York Corp.

• Richard A. Malsbary has been appointed manager of micrographics products for Datagraphix, Inc.

• Gary M. Cowles has been appointed staff vice-president and marketing director of General Dynamics Communications Co.

• Dr. Paul V. Daverio has been appointed vice-president, management information systems, at Owens-Corning Fiberglass Corp.

• Steve Frankel has been promoted to vice-president of engineering at Computer Transmission Corp.

• Henry Arnold III has been named vice-president of engineering and manufacturing by Warrex Computer Corp. of Dallas.

• J.C. Matlock Jr. has been promoted to senior vice-president of Data Processing Security, Inc. of Hurst, Texas.

• Richard H. Ericson has been promoted to the new position of vice-president, supplies group, at Dataproducts Corp.

• Richard B. Smith has joined American Satellite Corp. as vice-president for specialized network sales.

• John Clark has been promoted to president of Itel Corp.'s data products group and elected a vice-president of the parent corporation.

• Thomas Allen has been appointed vice-president, sales, for Xerox Computer Services.

• Eugene Feather has joined Vector Development, Inc. as vice-president, computer systems.

• Charles von Urff has been appointed vice-president and general manager of the newly formed data communications division of Western Digital Corp.

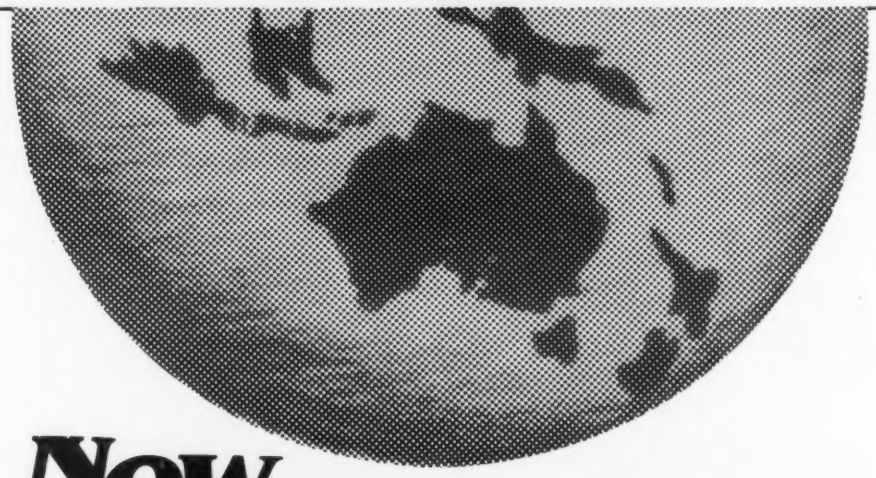
• Norman W. Paurus has been named vice-president of resource operations for the engineering services organization of Control Data Corp.

• Frank McEntee has been appointed vice-president of manufacturing at Diva, Inc.

• Samuel L. Shanaman has been appointed vice-president and controller at Nixdorf Computer Corp.

• Anthony J. Comazzi, Michael D. Radice and Jules M. Seshens have been appointed to newly created vice-presidential positions at Comshare.

• Rudolph R. Menna has been named senior vice-president and group executive of Data Dimensions, Inc.'s equipment group. Kenneth E. Wortz succeeds Menna as president of the division. Named controller was Gary L. Leeds.



Now Computerworld can take you down under

As of July, the world will have a new *Computerworld*. *Australasian Computerworld* will become the newsweekly for the computer communities of Australia, New Zealand, New Guinea, Phillipines, Thailand, Indonesia, Singapore and other Pacific Ocean countries.

Taken together, these countries comprise a large and growing EDP market, ranking approximately 9th in the world in value of general purpose computer systems, according to figures from International Data Corporation—the world's leading EDP market research firm. And they are major importers of US-made computer products. Australia alone, according to US Commerce Department figures, will be spending over $400 million on US computer equipment by 1980.

As our wholly owned sister publication, *Australasian Computerworld* will maintain the same format and excellent editorial content that has made *Computerworld* so successful in America. And it will be read by the key EDP buying influences throughout its area.

We invite you to become a charter advertiser in *Australasian Computerworld,* and we'll be glad to give you more details. Just give us a call or send in the coupon. And don't forget our other international sister publications. We'll be happy to give you information on any of them, as well. Here's the list of all our computer publications.

COUNTRY	WORLD RANK (by value of computers)	PUBLICATION[S]
U.S.	1	*Computerworld*
JAPAN	2	*Shukan Computer*
GERMANY	3	*Computerwoche*
UNITED KINGDOM	4	*Computer Management*
FRANCE	5	*Zero-Un Informatique*
ITALY	8	*EDP Notizie* *Sistemi E Automazione*
AUSTRALIA	9	*Australasian Computerworld*
BRAZIL	17	*Data News*

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20 Manufacturer (other)
30 DP Service Bureau/Software/Planning/Consulting
40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
75 Business Service (except DP)
80 Education/Medicine/Law
85 Government-Federal/State/Local
90 Printing/Publishing/Other Communication Service
95 Other: _____

TITLE/OCCUPATION/FUNCTION
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
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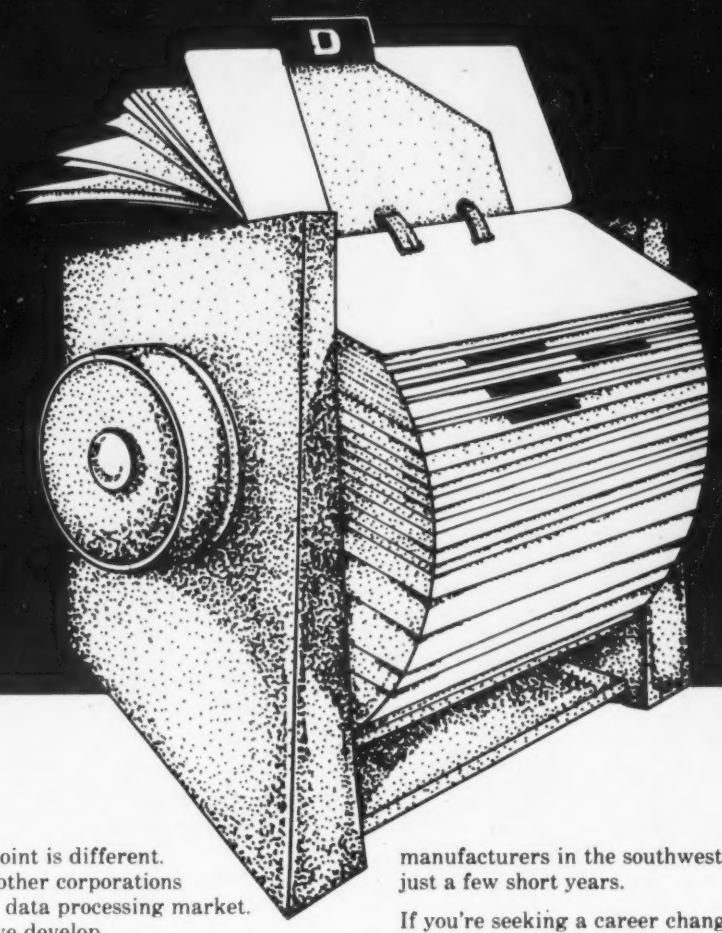

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COMPUTER LOGIC ENGINEERS
Requires TTL and/or ECL experience.

SENIOR DESIGN ENGINEERS
5 years experience in digital communications design and development.

POWER DESIGN ENGINEERS
Experience in design of power supplies and power controls for digital computer systems. Familiarity with state-of-the-art switching, regulator and converter designs.

CIRCUIT DESIGN ENGINEERS
Design of digital and analog circuits or RF design.

TEST EQUIPMENT DESIGN ENGINEERS
BSEE with test equipment design experience. BTTE/ATTE.

MANUFACTURING ENGINEERS
Experience in process development and control for high volume production. Emphasis in printed circuit board fabrication.

MICROCODERS
Minimum 1 year experience in digital logic design.

STANDARDS ENGINEERS
Experience in electrical standards and safety.

CHEMISTS/CHEMICAL ENGINEERS
Experience in chemical plating processes for precision printed circuit boards.

SYSTEMS PROGRAMMERS
Experience in peripheral devices, operating systems, net working and redundant systems, communications systems and language development.

FIRMWARE ENGINEERS
BSEE or Computer Science for product definition for terminal equipment. Experience necessary in hardware and software related to on-line terminal systems.

Call our Employment Department at 1-800-453-4534.
If not convenient to call, please send your resume to:
Employment Department,

SPERRY UNIVAC

General Systems Division
322 North 2200 West, Salt Lake City, Utah 84116

SPERRY UNIVAC
Roseville, Minnesota

Sperry Univac's Roseville operations is the focal point for the design, development and manufacture of Univac's large scale general purpose computer systems. We compete successfully in the world market and have enjoyed a consistent 15% annual growth rate for the past several years.

The acceptance of our recently announced 90/80 and 1100/80 systems is far exceeding expectations. And further establishes without question, our position as an international leader in data processing systems. Our latest processors rival the 3033 and the V7 in speed. We are deeply involved in some sub-nanosecond logic and VLSI technology. Software efforts include the design of advance 1100 series operating systems, language processors, and the new peripheral sub-systems.

ELECTRICAL ENGINEERS
System and component clock design for the next generation systems. Experience in circuit design,. escalator, clock systems. Will work with CAD mechanical design and logic design groups.
Plan, supervise and coordinate LSI design projects. Bipolar and MOS experience highly desirable.

LOGICIANS
Microcode design at algorithm (definition) level. Refine micro-instruction set, micro-sequence, micro-store size, and word length. Experience in definition and design of a unit implementing micro-coded architecture.
I/O Logic Design, plus simulation and check out of prototype. Background in logic design either at I/O channel or control unit is desirable.

AUTOMATED DESIGN ENGINEERS
Develop techniques and install design aids to reduce design time and improve quality of LSI efforts.
Define, develop and test CAD software as applied to layout and test of hardware.
Study and recommend hardware design features to enhance test ability and fault isolation.
Design and implement test programs.
Definition and logic design implementation and engineering tests of CPU components such as instruction processors, I/O units and high speed buffers. Knowledge of hardware/software organization, SSI/MSI/LSI implementation and micro-programming.

COMPONENT ENGINEER
Interfaces with TC vendors and design groups regarding component development and applications. Selects and tests components, advising on circuits, applications, failure modes, reliability and costs.

ELECTRICAL ENGINEER
Definition, design and development of large scale memory sub-systems. Experience with large, high performance semiconductor main memory systems.

SYSTEMS PROGRAMMER
Design, develop and test advanced 1100 series operating systems for current and unannouced products. Background in executive development desirable, preferably on large scale general purpose mainframes.

If you are unable to attend the Conference, please send your resume to:
Employment Department, MS 4973.

SPERRY UNIVAC

Development and Manufacturing
2276 Highcrest Drive, Roseville, Minnesota 55113

MINI-COMPUTER OPERATIONS
Irvine, California

Sperry Univac has immediate professional positions available for select individuals directly involved with mini-computer development. A position with Sperry Univac offers not only technical responsibility, but the opportunity to grow with it.

COMPUTER DEVELOPMENT
Design high performance micro-programmed mini-computers; design high performance arithmetic processors; participate in the development of advanced computer architectures; design and check out intelligent I/O processors.

DATA COMMUNICATIONS
Develop intelligent data communications processors; develop advanced data communications controllers for new systems; design hardware for asynchronous and synchronous protocols (BSC, SDLC, UDLC, HDLC).

PERIPHERIAL CONTROLLER
Design and test high performance low cost micro-programmed controllers, microprocessors and floppy disc development; evaluate and select low cost and secondary storage peripherals; define advanced I/O architectures.

DESIGN
Software and hardware design engineers with BSEE or equivalent and 5 years experience in logic design; assignments will be to both new and existing product lines.

QUALITY
Degree in electronics or computer science or 2-5 years quality experience in computer program development and/or software development. Qualified candidates must be able to perform effectively in at least one of the following areas: computer software quality assurance, product evaluation/reliability, or vendor support/electronic components.

TEST
At least 3 years experience in data processing industry, with one or more of the following: preparing test plans and procedures, working experience with hardware and programming, design and development of automated test equipment, or technician training. Knowledgeable in new product and hardware design, competence in new product design test capability. BSEE preferred, not mandatory.

DATA COMMUNICATIONS DEVELOPMENT ANALYSTS AND PRE-SALES SUPPORT
Design software and be responsible for the implementation of asynchronous and synchronous protocols. Design transaction oriented systems, Distributive Communications Architecture, and front-end processors. Project Manager opportunities. Direct assembly and language experience required. Estimate time and cost of Data Communications software for customers. Evaluate customer software RFQ/ RFP's, design creative solutions for customer's needs, and provide state-of-the-art technical leadership.

HIGH LEVEL LANGUAGE
Pascal or Algol programming; Fortran compiler development; data base access/Query; project management.

DIAGNOSTICS
Individuals will be members of hardware/software design team involved in mini-computer test systems development. Positions will include project responsibility for all phases of assembly language and microprogramming language implemented programs and development of system level testing and fault-isolation software.

SPECIAL SOFTWARE
Provide real-time systems programming, special interfaces/device drivers, diagnostic hardware/software, project control, cost estimates and assembler languages.

CUSTOM APPLICATIONS
Position responsibilities include industrial automation, distributed processing networks, assembly and high level language, on-line transaction systems, Data Base Management Systems, proposal writing, specifications design and project management.

OPERATING SYSTEMS
Design and development of data communications software for operating systems development, DBMS design/implementation, use of DBMS in distributed environments, on-line teleprocessing and line and network protocols.

If you are unable to attend the Conference, please submit your resume to Employment:

SPERRY UNIVAC

MINI-COMPUTER OPERATIONS
2722 Michelson Drive, Irvine, California 92713

Each of the above divisions will be represented at the National Computer Conference. Visit us at the Rip Van Winkle Inn, 301 W. Katella, Anaheim, or call 714/776-6210 and leave a message where you may be reached.

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NCC Attendees

There's room at the top.

Digital is looking for ambitious computer pros who want to move up fast. Because we're a billion and a half dollar company that's growing bigger all the time, you'll get the chance to move up faster than you would anywhere else. And because we're growing all over the country, chances are you'll be able to move up anywhere you want.

Compare your company's growth and potential with Digital's. You'll see there's a lot more room at the top with us.

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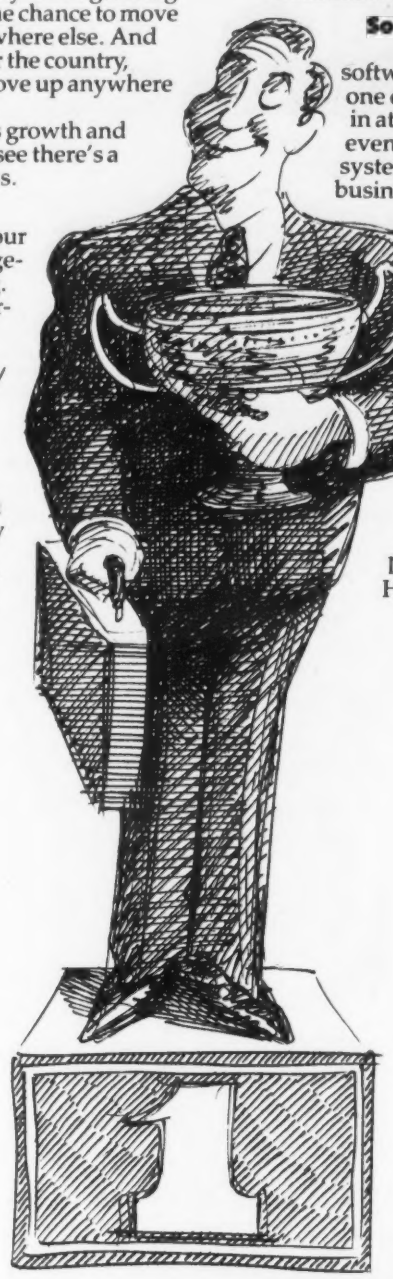
As a sales rep at Digital, your career can move up into management, or senior levels of selling. Or into marketing. Manufacturing. Product development. Anything. What you need is sales experience or a computer/technical background in hardware or software and the drive to succeed.

Field Engineers

If you've gone as far as you can with your present company and are looking for more room to grow, Digital is the company for you. We're looking for pros with experience in preventive and corrective maintainance with any digital processor and peripheral system, and a solid electronics background.



Software Specialists

Digital is looking for the best software people in the country. If you're one of them you'll also need experience in at least one of these areas: real time; event-driven applications; operating system design and modifications; business application design; RSX-11, RSTS/E, Tops 10, Assembly, or Fortran.

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Call **(800) 225-9228** (in Mass. call (617) 493-2721). Between June 3 and June 8 call **(714) 778-6600 at the** Disneyland Hotel.

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Assistant Professor: Beginning September. Applicants should have strong interest and capability to teach full and lower level mathematics courses and assist in implementation of a new major in Applied Computer Systems. Ph.D. in computer science or closely related field required. Preference given to experience in business data processing or computer hardware.

Systems Programmer: Responsible for systems programming and development of major applications systems. Provide assistance for faculty and students. BS in Computer Science or related field and experience with statistics and SPSS. Knowledge of BASIC, FORTRAN, COBOL and operations experience desirable.

Send resumes and inquiries to:
Dr. David L. Feinstein
Department of Mathematics/ Computer Science

University of Wisconsin-River Falls
River Falls, Wisconsin 54022
Deadline for applications is June 14.
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Immediate opening for an instructor with experience in at least two of the following areas: business systems analysis, programming languages (COBOL or Fortran or RPG), basic computer introductory courses, and computer math. Minimum requirements prefer B.S. in Computer Science or related field but would consider experienced person. Salary open.

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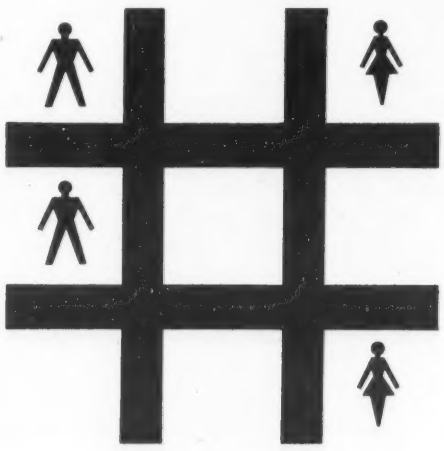

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WHO ARE WE?

Ford Aerospace & Communications Corporation, Western Development Laboratories Division, is one of the San Francisco Bay Area's fastest growing software systems developers. In response to this growth, WDL established a Software Engineering Directorate, reporting to the General Manager of WDL, with laboratory-wide responsibilty to:

- ★ establish software policies, standards and procedures
- ★ develop long-range software technology, tools, and programming aids for general use
- ★ establish and enforce a software inspection and quality control system
- ★ establish a system of design and proposal reviews for software-intensive programs
- ★ provide software support to other WDL operations

The new Software Engineering Directorate complements our software efforts based in the Communications Products, Data Systems, Satellite Communications and Special Programs Organizations.

WHAT IS OUR TECHNOLOGY?

We're meeting our objectives through a strong program that blends IR&D, contracts, and internal projects. Our current high-technology contracts include:

- ★ secure minicomputer operating systems development
- ★ distributed data-base studies
- ★ computer network architecture studies

What technology is important to WDL? Here are the areas to which we are committing significant resources:

UNIX-based software engineering
- —PWB/UNIX
- —Development support systems
- —Software development tools
- —Specification languages

Reliable systems technology
- —Formal specification and program verification
- —Secure computer systems
- —Test and validation

Distributed systems technology
- —Data base management systems
- —Real-time data collection/synthesis
- —Local network architectures
- —Network protocols (NCP—TCP, EtherNet)
- —1 to 200 MBPS bandwidth

Operating systems architecture
- —Capability-based systems
- —Network systems (micro, mini, midi, maxi)

WHAT JOBS DO WE HAVE?

Systems Development Programmer
As part of a development team, you will be responsible for implementing a secure mini-computer based operating system from mathematically proven formal specifications. The programming language will be EUCLID running in a PWB/UNIX environment.

Operating Systems Designer
You will draw upon your experience with several operating systems, your academic training, and your ability to conceptualize and communicate in order to design and specify a new class of operating system. You will learn to express your design in a formal specification language and to subject your specifications to rigorous analysis.

Software Test Specialist
You will break new ground in design of test methods for provably secure systems. Using your familiarity with modern software testing methodologies, you will interact with the systems design team. As a result, you will become familiar with formal mathematical specification techniques.

Software Toolsmith
You will work in a PWB/UNIX environment to create tools to make the software development process more exact and less error-prone. An excellent position for growth in software technology.

Network Systems Specialist
You will be involved in development of high-bandwidth local computer networks. This effort will require you to apply your knowledge of current experience and research in network protocols, network architecture, and hardware.

Software QA Specialists
You will use your knowledge of MIL-S-52779 and modern software QA systems to develop and apply WDL-wide software QA methodologies. Knowledge of modern systems development practices and high level systems programming languages is also required.

The Problem Solver
If you're one of those especially talented individuals who relishes the challenge of solving complex problems at the forefront of the computer technology areas we discuss in this ad, we would like to discuss your interests with you. We always have openings for EXCEPTIONAL people.

Special Projects
We are seeking all levels of software experience in the design and development of large scale real-time communications systems. In our operation, you may apply and expand your skills in real-time operating systems, distributed processing, signal processing, data base management, operator-machine interface and hardware control. You will use your knowledge of state-of-the-art technology to solve challenging classified problems.

If you have a BS, MS, PhD or equivalent related experience in one or more of the technology areas we've discussed, and if you qualify for the WDL software team, you will receive the professional recognition you deserve, excellent compensation, and one of the best fringe benefits packages in the industry.

WHAT CAN YOU DO TO JOIN OUR TEAM?

If you are attending the NCC and would like a personal interview with one of our Software Managers, please call collect (415) 494-7400, Ext. 6601, 6602, 6603, 4016.

If unable to call, please send resume with salary history/requirements to
Professional Employment, Department PF-55.

Ford Aerospace & Communications Corporation

Western Development Laboratories Division
3939 Fabian Way, Palo Alto, California 94303

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CAREER OPPORTUNITIES AVAILABLE

We are an established package software comapny located in northern Indiana, 90 minutes from Chicago. Our rapid growth has creatgd several attractive career opportunities for the right people. We offer a friendly small town lifestyle with outstanding recreational facilities available for tennis, golf, fishing, boating and numerous winter sports. We are a progressive, people-oriented organization. The positions offer excellent salaries, good benefits, flexible working hours, and exceptional advancement opportunities. Openings currently exist in:

Programming - We have several openings at varying levels. Requirements range from 0-6 years experience. Knowledge of PDP-11's, RSTS/E, BASIC-PLUS and/or accounting applications desirable. Degree a plus.

For immediate consideration, please send your resume, with salary history, references and requirements to Mr. Al Chesser, PLYCOM Services, Inc., P.O. Box 160, Plymouth, IN 46563.

Plycom services, Inc.

SYSTEMS ANALYST 11

Supervises, maintains, develops and implements a unified and cohesive automated library system. Current components include a monographic catalog resulting in COM fiche, an on-line process file, and map and serial subsystems. Programming and design policy is structured with modular components. Aids in decision process for equipment and systems development.

Qualifications:

Masters degree in Computer Science with emphasis in data base management and character processing or Bachelors degree in mathematics or science and two — three years experience in the computer field dealing with problem-oriented systems.

Knowlege of COBOL or other high level character and file oriented language, computer hardware and interactive relationships of components of large machine, and of data base management and character processing.

Supervisory experience desirable. Minimum salary $15,000. Send resume to

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Georgia Institute of Technology
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Austin also is generally acknowledged to be the most cosmopolitan of all the state capitals and the most beautiful city in the Southwest.

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The city's cost of living is lower than that of any other city surveyed by the Bureau of Labor Statistics. (Believe it or not, Austin's city and school taxes went *down* in 1977.) And in Texas, you pay no state income tax.

People all over are trying to dream up excuses for moving to Austin. Lucky you. You're a minicomputer specialist. *Austin is looking for you.*

We want to hear from people qualified for the following positions:

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TI has several new openings for both entry level and experienced software technical writers. Candidates will join an expanding publications team preparing software documentation for minicomputer systems, distributed processing systems, intelligent terminals and other state-of-the-art products now under development. Applicants should have a Computer Science or related degree and 1-5 years' experience in preparing user documentation for computer programs. Entry level candidates with strong data processing backgrounds will be considered.

Software Support Programmer
Duties will require maintenance of existing software packages and assist in our nationwide field operation.

Systems Development Programmer
Opportunities on a new project of multi-microprocessor products using the latest memory architecture. Opportunities also include design of new operating systems for follow-on products.

Applications Programmer
Project member for commercial, industrial or business systems departments having direct contact with customers doing software product development.

Diagnostics Programmer
Design/development of intensive unit/systems level diagnostic software for 990 computers in a stand-alone and real-time environment.

Business Programmer
Design new systems with COBOL to satisfy the needs of a small business computer user.

Marketing Analyst
Responsibilities through marketing for software products including research, competitive analysis, and coordination with software development. Must have a CS degree.

Communication Systems Analyst
Opportunities exist for persons experienced in design and development of communication systems. Experience will be required in computer communications, package switching, distributed processing or computer networking.

● Applicants for the above programming positions must possess a background in one or more of the following areas: microprocessors, operating systems, distributive processing networks, assembly and higher level languages. Requirements also include ability to communicate effectively, desire to work with customers, and a BS in CS, EE or Math.

Immediate Openings in Southfield, Michigan
Texas Instruments, Industrial Automation Center, in Southfield, north of Detroit, has immediate openings for qualified systems programmers to work on varied computer based automation requirements. These opportunities are also a part of the Digital Systems Division in Austin, Texas. These positions entail generating unique applications programs in response to customer specifications and hardware configuration for manufacturing automation. BS in EE, Physics, Math or Computer Science and related experience in minicomputer applications required.

Please send your resume (for confidential handling) to: Lee Cooke/Staffing Manager/P. O. Box 2909, M.S. 2106/Austin, TX 78769.

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The position reports to the Assistant Director for R&I and Technical Services.

Required: B.S. in Computer or TC-related field and two years experience in TC or systems programming. Salary: $1300/Mo. minimum based on experience and qualifications. This is a 12-month position with 23 days annual leave and many benefits.

Send letter of application, resume and references to:

Chris Brix
Dir. of Computer Center
Western Illinois University
Macomb, IL 61455
(309) 298-1944

Deadline for application is June 20, 1978.

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Jockey International, a prestigious, nationally known Midwest based apparel company has announced the expansion of their M.I.S. Department creating openings for:

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Minimum four years experience in systems analysis and design. Must have thorough knowledge of COBOL and experience in a variety of application areas, from actual design through implementation.

PROGRAMMER/ANALYST

Minimum of two years COBOL programming experience.
For the above positions experience in the following areas would be considered a plus:

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Or meet directly with Elliot Wassarman, Vice President, Marketing, during the NCC Conference in Anaheim June 5-8 at the Qume Booth - Space #2313.

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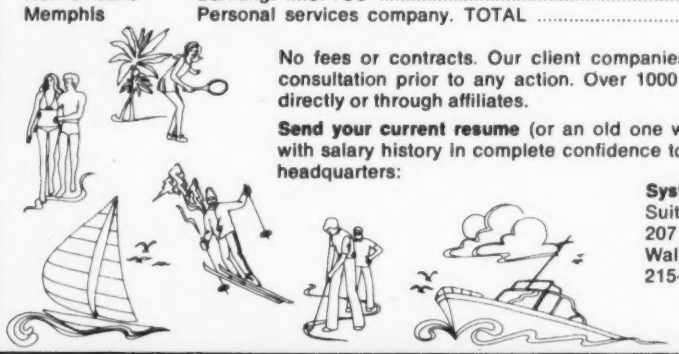
Atlanta	Insurance. Some design work	$16-20M
S. Carolina	Insurance. Heavy expansion	15-18M
Orlando	Manufacturing and financial. Degree necessary	17-20M
Richmond	Tobacco. Learn IMS	15-20M
California		
San Francisco	Banking. Multiple openings. State of the art. IMS shop	16-22M
San Francisco	Insurance. Ocean location	18-22M
Los Angeles	Computer services company. Degree necessary	16-22M
Southwest		
San Antonio	Insurance. IMS, TSO, MVS environ. Low cost of living area.	14-18M
Albuquerque	Utility. Large scale. Super benefits	14-19M
Houston	Major oil company. Degree necessary. Promotion opportunity	15-19M
Dallas	Financial company. 20 openings.	15-19M
Northeast		
Philadelphia	University environment. 10 openings. User liaison.	15-21M
New Jersey	Telecommunications company. 10 openings	15-20M
Hartford	Insurance. Learn on-line and data base	16-20M
Midwest		
Sub. Chicago	Electronic manufacturing. Staff doubling	16-22M
St. Louis	Computer services company. Applications variety	15-19M
Central Ill.	Rural. Teleprocessing environment	14-18M
South		
New Orleans	Banking. IMS/TSO	15-18M
Memphis	Personal services company. TOTAL	15-18M



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Send your current resume (or an old one with pencil update) together with salary history in complete confidence to our suburban Philadelphia headquarters:

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OPERATIONS RESEARCH/ PROGRAMMER

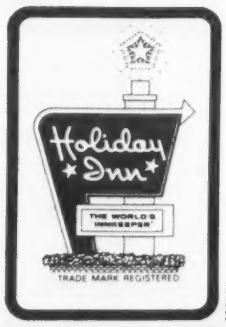
To develop a comprehensive Reservation Information System. Qualifications to include experience in one or more of the following areas:

- **Information systems**
- **1-3 years VS COBOL**
- **Data base design**
- **Applied business statistics**

SYSTEMS PROGRAMMERS
APPLICATIONS PROGRAMMERS

To develop an on-line reservation system. Qualifications to include experience in one or more of the following areas:

- **4-6 years operating system software**
- **ACP, VM, VS-1**
- **BAL, PL-1**
- **SCRIPT and EDGAR A plus**
- **1-2 years ACP applications programming**



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Equal Opportunity Employer M/F

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ADR is the #1 software products company in the world. Founded in 1959, we have software installed at over 8,000 computer sites, more than any other independent software company. We are large enough to be stable and respected, small enough to be informal, with lots of room for recognition and advancement. We currently employ over 280 people and our annual sales exceed $20,000,000. ADR has 8 branch offices in the United States and is represented in 35 foreign countries.

The Products

ADR's diverse product line is state-of-the-art. Our systems range from on-line programming systems to language translators; from text processing to performance measurement. IBM technological advances are usually heralded by new ADR products. ADR software products are rated #1 in the 1977 Datapro survey — surpassing every other company in the number of products (4) honored by Datapro.

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ADR offers the comfortable, informal surroundings best suited to system development. At ADR, members of the technical staff average twelve years of computer experience. They constantly have opportunities to expand their professional skills into new technological areas. Our role as a pioneer in the software products industry gives our employees a unique position in the computer industry. At ADR, you are part of the leading edge of technology, not a follower.

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If you are a capable IBM Assembly language programmer and consider yourself a System Software Specialist, then you definitely should consider ADR. We have openings at all levels for qualified programmers and analysts who have the capabilities for developing sophisticated, state-of-the-art software. Experience with on-line systems (CICS, TSO, etc.) or knowledge of OS internals is a definite plus. If you have participated in the development of any type of software packages — system, utility, or application — we would really like to talk to you.

Please send your resume in complete confidence, including current salary and position desired, to: Director, Software Products Division. Or call 609-921-8550.

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EDP Auditor
Programmer Analyst

The Headquarters of Exxon's Latin-American region, located in Coral Gables, Florida, is seeking applicants for the following positions:

- **EDP Field Auditor**
  Initial assignment will be as a programmer/analyst in Coral Gables in the Headquarters Data Processing Division. After approximately two years, the individual will move to the field Audit staff.
- **Programmer/Analyst**
  Assignment will be as a programmer/analyst in Coral Gables in the Headquarters Data Processing Division.

Applicants should have the following qualifications:

- Two years commercial application programming experience using PL/1 and OS.
- Bachelors degree in business or accounting, MBA preferred.
- Excellent written and oral communication skills.

In addition, Field Auditor applicants should have:

- Ability to learn foreign languages
- Flexibility to travel extensively

We offer salaries commensurate with background and experience. The successful applicant can look forward to comprehensive benefits and long term career opportunities with Exxon.

Please send resume and salary history in confidence to: MCS Division Manager, ESSO Inter-America, Inc., 396 Alhambra Circle, Coral Gables, FL. 33134.

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We are currently seeking talented individuals for junior, senior, and mgmt-level positions in the 16-40K range.

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We represent several clients engaged in activities involving various segments of the computer industry.

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data processing

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Qualified candidates are invited to direct their response to Phil Beckhelm, Amdahl Corporation, P.O. Box 5070, Sunnyvale, CA 94086. Or call him collect at 408/746-6165. We are an equal opportunity employer.

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- **IMS**
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- **TSO/TCSM/VTAM**
- **VM**

In addition, you have the ability to read dumps and write code to resolve system problems. Please indicate 820-E on your response.

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You will carry the Amdahl philosophy of customer service as well as your expertise into the field to aid the customer in restoring computer center operations regardless of the origin of the failure. You will have the opportunity to utilize your initiative and talents in the following areas:

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We're looking for individuals involved in realtime command and control, data base, test and integration, signal processing, communications, or text processing, with experience in one or more of the following: PDP 11, NOVA, ROLM, UYK 7 & 20, HP, INTEL 8080 and Z-80 with knowledge of FORTRAN, ASSEMBLY, PASCAL, or CMS-2. Requires BS in Computer Science, EE, Math, or equivalent experience, master's degree desirable.

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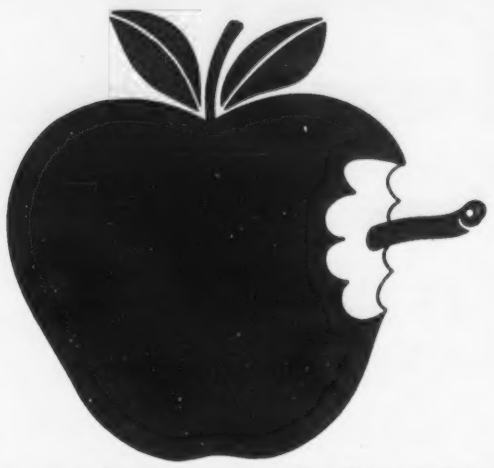

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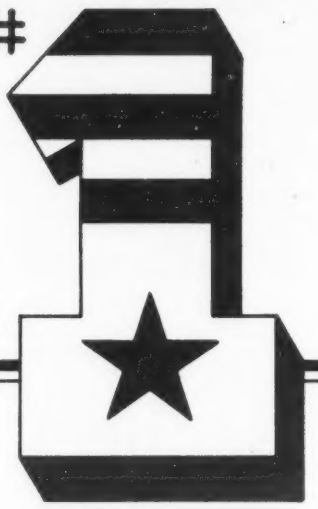

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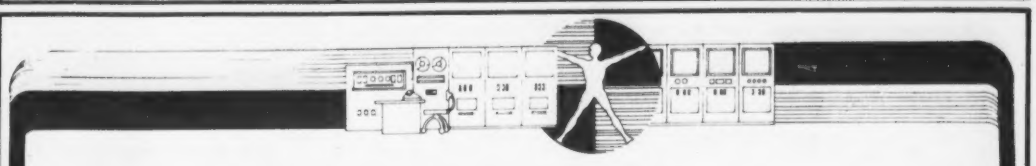

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If you belong at OSI (and not everyone does)... if you're truly the kind of SPECIALIST who can contribute both technical expertise and sound personal judgement... if you can help us CLICK, then we'll provide you with a career growth opportunity quite unique within the Data Processing Industry.

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We offer a competitively high salary as well as an outstanding benefits program. Most of all, though, we offer an unlimited career opportunity with a keenly professional, highly organized team of specialists.

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PROGRAMMER/ANALYSTS
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- B.A. or B.S. degree, with a minimum of 2 years' ANS-COBOL using an IBM/OS system, or 2-years' large scale IBM/OS or VS experience.
- B.A. or B.S. degree, plus 3-5 years' data processing experience, including COBOL, (ANS), IBM/OS, utilities, CFMS, CICS.

PROJECT MANAGERS
We have several openings in this area to manage technical staffs developing large file designs and data structure projects, and supervision of systems analysts. The work involves health care; claims processing; technical project control; interpretation and definition of customer requirements at management levels. Qualifications should include a B.A. or B.S. in math, engineering or science, 5 years' data processing experience including OS, COBOL and JCL, plus related health care experience.

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SYSTEMS ANALYSTS
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- 4 years data processing experience, and 1-2 years' in systems analysis/customer interface. Health care experience is desirable.

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SYSTEMS ENGINEER
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NCC Interviews June 5-8

Honeywell's highly successful nationwide Search for the best computer professionals in the industry is coming to The National Computer Conference.

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Now The Search is coming to the National Computer Conference. Throughout the conference (June 5-8), you'll have a chance to talk with Honeywell managers and other key personnel about where Honeywell is taking computers and what we can offer you. Our Small/Medium Information Systems Division (S/MISD) and our Large Information Systems Division (LISD) are continuing to grow rapidly and have exciting career growth opportunities available in a broad range of areas.

So while you're at the National Computer Conference, find out why The Search — and Honeywell — are so successful.

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Participate in state-of-the-art circuit technology programs including MOS and LSI microprocessor chip design.

TERMINALS AND COMMUNICATION DEFINITION ENGINEERS
Perform original system design work in communications processor, terminal, and related minicomputer I/O hardware areas.

SOFTWARE/HARDWARE WRITERS
Software technical writers with at least 5 years in computer programming or in technical writing with exposure to computer software and/or hardware.

HARDWARE/FIRMWARE ENGINEERS
Hardware/firmware professionals are needed in processor design, with the emphasis on firmware development and special emphasis on high performance product design.

TERMINAL ENGINEERS
Hardware/firmware experience in design and development of new CRT terminal products.

COMPONENT/MATERIALS ENGINEERS
Experienced in component evaluation and specification.

LEVEL 6 MINICOMPUTERS

SALES ENGINEERS
Sales Engineers, with a BS in Engineering or its equivalent and 3-5 years selling to OEM's, System Builders and large end users.

SYSTEMS ANALYSTS
2+ years sales support experience with minicomputers, a knowledge of assembly language, compilers and operating systems.

MARKET ANALYSTS/PLANNERS
3-5 years experience in Market Planning for minicomputers and/or sales experience to the OEM/Systems Builder marketplace.

SMALL/MEDIUM INFORMATION SYSTEMS DIVISION — BRIGHTON, MASSACHUSETTS

Manufacturing Support

PCB ASSEMBLY ENGINEERS
Apply process control techniques and generate quality plans and inspection procedures in PCB assembly and automatic component insertion. ASQC certification is required.

PROCESS CONTROL ENGINEERS
Professionals with ASQC certification to establish process control parameters in resist application, drilling, lamination and printed wiring board fabrication operations.

VENDOR ENGINEERS
Inspection and testing of vendor supplied devices, with responsibility for LSI, MSI, bipolar and linear IC types. Experience in the use and programming of IC test computers.

PROCESS ENGINEERS
Experience in electro/mechanical assembly processes and procedures in printed wiring board fabrication and assembly.

Even if you're not looking for a new position, don't pass up this opportunity to see for yourself what all the excitement is about.

NCC Interviews

To arrange for an interview during the National Computer Conference, please call Lou Sinagra for S/MISD positions or Stel Fedor for the LISD positions at the Griswolds/Anaheim at (714) 956-4978 Or drop by our Career Hospitality Suite at the Griswolds/Anaheim. Limousine service will be provided from the Convention Center to the Griswolds/Anaheim all during the conference.

If you are unable to meet with us at this time, please forward your resume, including salary history, and indicating position or positions of interest to:

FOR S/MISD POSITIONS
Mr. Lou Sinagra
HONEYWELL S/MISD, BM-002, 300 Concord Road, Billerica, Massachusetts 01821

FOR LISD POSITIONS — PHOENIX
Manager, Recruitment & Placement
HONEYWELL, P.O. Box 6000, M/S Y-150, Phoenix, AZ 85005

FOR LISD POSITIONS — LOS ANGELES
Ms. Martha Andreani
HONEYWELL, Los Angeles Development Center, 5250 West Century Blvd., Los Angeles, CA 90045

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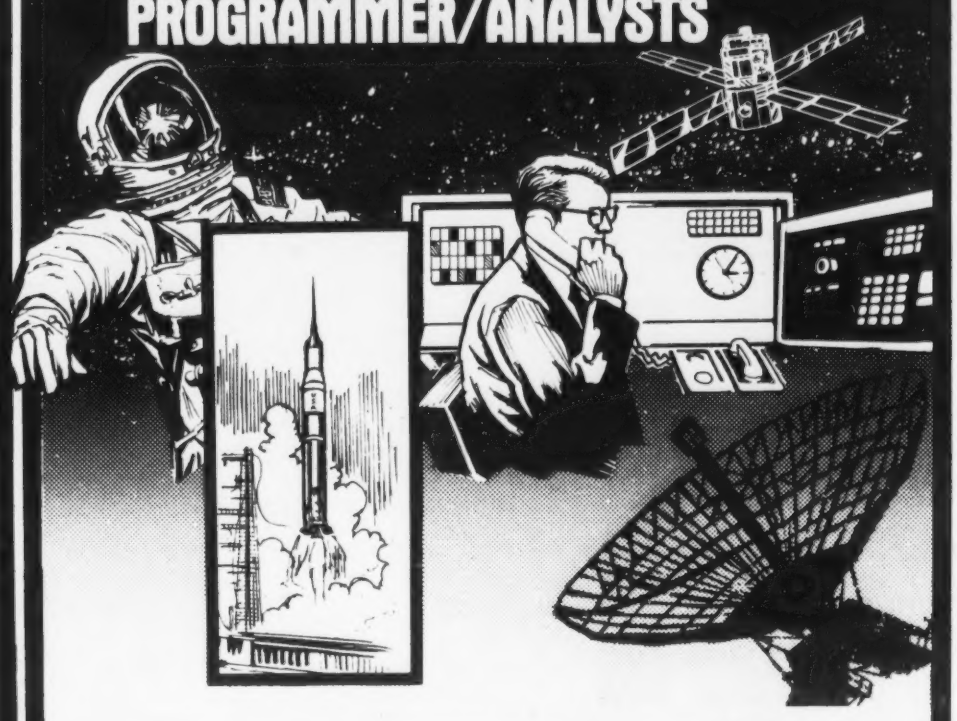

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3-5 years programming experience preferred with banking applications experience: Inst. loans, R/E, Com'l loans, DDA, TDA, Charge Card (M/C and/or Visa preferred).

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- 4-Programmer/Analysts-COBOL, CICS
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- 5-Systems Analysts-Strong COBOL

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Anaheim Interviews
Sunday, Monday, Tuesday
June 4, 5, 6, 1978

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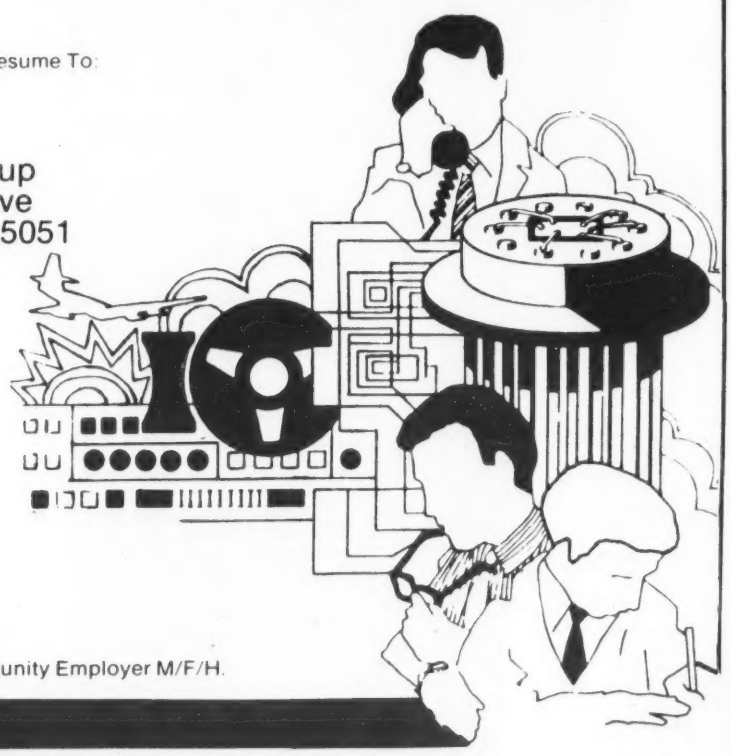

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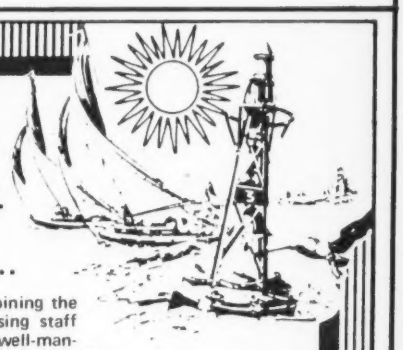

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Systems Manager

Polytechnic Institute of New York, a private higher educational institution, is recruiting a Systems Manager for its administrative data processing. Training and experience must include: design and installation of total integrated systems, both manual and automated, involving financial, student information, and fund-raising activity; systems documentation and training; review and redesign of work procedures and work flow to improve efficiency and effectiveness; supervision of PL1 and COBOL programmers, systems analysts, and industrial engineers. Bachelor's degree and 5 years experience required, Master's degree preferred. Send resume, salary history and current requirements to Personnel Office, Polytechnic Institute of New York, 333 Jay St., Brooklyn, N.Y. 11201.

Polytechnic

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DIRECTOR OF COMPUTER SERVICES COLBY COLLEGE

Applications are invited for the position of Director of Computer Services at Colby College. The position is available immediately. The Director will have overall responsibility for planning and directing the data-processing activities of the College, including management and development of PDP 11-based administrative systems as well as academic program. Preference will be given to candidates holding an appropriate advanced degree and having several years experience in a computer center at an academic institution. Salary and benefits competitive. Send resumes including names of three references not later than June 16, 1978 to: Paul G. Jenson, Dean of Faculty, Colby College, Waterville, Maine 04901. An Equal Opportunity/Affirmative Action Employer.

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As a major corporation with four growing divisions totaling nearly $3-1/2 billion in sales, we have substantial needs in the development, planning and control of data processing systems. Our environment is one of unique challenge and diversity as we strive to utilize our talent and equipment to the fullest in developing and maintaining effective systems and techniques. If you're a professional who thrives in a modern and demanding management information system, we'd like to talk to you about your career.

SR. SYSTEMS PROGRAMMER

You'll provide a high level of IMS programming and technical expertise to insure the use of the most efficient and effective standards, techniques and procedures available in the industry. Also analyze application of information, specifications and systems design and determine the most effective approach for implementation. The position requires 5 or more years of programming experience in a business environment, including 2 years in current generation languages and 3 years with IBM computer system. A degree in computer sciences or related area helpful.

SR. SYSTEMS PLANNER

You'll assure effective, responsive, stable and economical data processing capabilities throughout the domestic corporation. Requires the evaluation and development of information systems plans coinciding with corporate objectives, plans and directions. The position requires 7 or more years experience and demonstrated sucess in conceptualizing, planning and installing significant information systems. An MBA is preferred. Must have highly developed oral/written communication skills.

We provide outstanding challenge and satisfaction along with an excellent salary and benefits package. For confidential consideration please send a letter and/or resume to: M. Tomaszewski.

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BORDEN

COMPUTER PROFESSIONALS

SYSTEMS PROGRAMMER

Responsible for installation, support, and tuning of a large OS/VSI Operating System environment and associated telecommunications software. Also provides assistance to COBOL application programmers on dump reading and debugging. Applicant should have 3 years experience with OS internals and SYSGENS. Knowledge of CICS, data base, 3705, and VTAM/NCP highly desirable.

PROGRAMMER ANALYST

To analyze, design, program, implement and document computer systems for business and administrative applications. Selected candidate will be assigned to a project group reporting to a project leader. Requires a minimum of 2 years experience programming business applications in ANSI COBOL. IBM 360/370/OS/JCL experience and a degree preferred but not required.

PROGRAMMER ANALYST

Team of medical and computer professionals, seek programmer analyst for the COSTAR (computer stored ambulatory record system) project. Diverse responsibilities will include analyzing, designing, programming, implementing and documenting computer systems for patient care activities. Bachelor's degree with programming experience required.

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R.O.I.

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Opportunities also available for Hardware Professionals

Plan to visit our Hospitality Suite at the Admiral's Cove Inn, 1028 W. Ball, Anaheim, (714) 774-1650, within a mile from the NCC Convention Center, June 6th, 7th & 8th. If unable to meet with us at NCC/Anaheim, submit your resume in complete confidence to R.O.I., 131 Middlesex Turnpike, Burlington, MA 01803, or call us collectat (617) 273-2130.

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Growing Data Processing Department in national consulting engineering Firm seeks talented professionals to plan, develop and support engineering programs and systems. Varied work assignments in on-line program development using large, in-house DEC-10 timesharing system. Principal languages are Fortran, Cobol, Macro and Basic—plus others as needed. Must have degree in Computer, Science, Engineering or Math. Prefer technical background and work experience. Contact: (816) 333-4375 Personnel Dept.

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ASSISTANT DIRECTOR

CENTER FOR THE STUDY OF DATA PROCESSING

We are looking for an energetic, imaginative individual to join a university-based data processing educational organization, and take responsibility for the development of professional development programs, seminars, and intensive courses in data processing. The Center for the Study of Data Processing is composed of a select group of individuals dedicated to providing the Saint Louis metropolitan area with a center of excellence in data processing educational services.

The position offers a wide range of opportunities, including:

- **interaction with a dynamic metropolitan data processing community;**
- **an environment that mixes business, medicine, engineering, and arts and sciences computing activities;**
- **teaching and research opportunities, including the Master of Data Processing (MDP) program;**
- **computer facilities that include mini-computer networks and micro-computers as well as large traditional (IBM) systems.**

We would be particularly interested in candidates who have business experience and a strong desire to join a dynamic academic organization and participate in teaching and research programs. Candidates should have significant experience and/or education in computing or data processing. Salary range is $17,000 to $25,000. Candidates should submit resumes by June 15, 1978, to:

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If you have hardware or software experience in the above areas particularly in micro computer hardware or systems, we want to meet with you during NCC. If you're interested in the MANAGER-USER LANGUAGES position; we're looking for strong software engineering background including structured programming techniques and knowledge of compilers, table driven parsers, interpretive machine design. SYSTEMS LANGUAGE DEVELOPMENT requires knowledge of compilers code generation for advanced micros, block structured language and machine level programming.

To arrange an interview during the NCC contact:
Mr. C. J. Corona at (714) 549-9808

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- **Electronics Engineers** — Analog designer with 2-5 years experience, including at least 1 year in servo circuit design for small electro-mechanical subsystems. Experience in driver circuit design, power supply design preferred. A background in computer peripheral design, particularly printers, desired. BSEE required, MSEE preferred.
- **Mechanical Engineers** — BSME required with 2-5 years experience in electro-mechanical subsystems design, preferably printers. A knowledge of electronics packaging desirable. Also ME's with 2-5 years experience in mechanisms, tooling with metals and plastics with computer peripheral experience.
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If you are a qualified candidate, call Joe Carbone or Bob Harris, 1-800-531-7300, extension 7590 or 7548. Or send your resume to: **Charles Zeleny, Operations Personnel Manager, Datapoint Corporation, 9725 Datapoint Drive, San Antonio, Texas 78284.**

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The leader in dispersed data processing™

Sr. Data Base Analyst

BASF Wyandotte Corporation, a major subsidiary of one of the world's largest chemical companies, has the requirements for an additional analyst in our expanding Corporate Data Base Administration Department.

We are seeking an individual with 5-7 years experience in the design and implementation of IMS Data Bases for business and manufacturing applications. The ideal applicant will possess facilities and utilities, and the ability to interface with our Application Development Groups. Exposure to VSAM, BTS, TIMS or Data Dictionary Systems will be considered a plus.

Salary commensurate with experience and includes a comprehensive benefit package. For confidential consideration, please submit resume including salary requirements to:

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If you have 3 or more years of systems programming in telecommunications, and in designing and implementing packet switching and protocols like SNA, DECNET, Telenet and Arpanet—preferably know intelligent terminals, mini/microcomputers and IBM 3780 protocols as well—contact us at once.

* * *

Send resume and salary history to: Judy Power, Employment Representative, Information Service Business Division, General Electric Company, 401 N. Washington St., Rockville, Md. 20850.

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As an FSR for MSI, you have the opportunity to work independently representing our company in the professional business environment of our customers. In order to repair MSI terminals and receivers, this job requires previous experience in applying the fundamentals of digital electronic problems solving and troubleshooting. Excellent customer communication skills are also essential.

Technical Specialist

A minimum of 3-5 years' working experience along with military or vocational training is required in the following areas: Modems; telephone systems and interfaces; communications; mini and microprocessors; personnel training; technical administration, i.e. manuals, parts support, equipment histories.

Field Service Instructor

Responsibilities will include research, development and presentation of courses on MSI's terminal and receiver product lines at our Costa Mesa, California headquarters facility. Previous field experience in maintenance and repair of digital electronics equipment and the ability to create and implement effective training courses are required.

ENGINEERING

Microprocessor Design Engineer

A hardware design background or orientation, preferably with the INTEL microprocessor family is desired. Engineering responsibilities will include new product implementation and check out through high volume manufacturing phases.

Senior Electro-Mechanical Drafters

Job duties include working from verbal or written instructions to generate formal drawings of piece parts and assemblies. Extensive printed circuit board layout and design experience will be an asset.

Senior Engineering Technician

Must have microprocessor experience, a working knowledge of analog and digital circuits. Knowledge of communications devices (MODEM, DAA telephone lines) desirable. Minimum of 3 years' experience preferred.

MSI's leadership is reflected in the excellent compensation, benefits and progressive work environment we provide. Benefits include paid medical and life insurance, profit sharing and educational reimbursement.

Resumes should be directed to Vern Wiersma, MSI Data Corporation, 340 Fischer Avenue, Costa Mesa, CA 92627 or call (714) 549-6126.

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Equal opportunity employer

SYSTEMS PROGRAMMER

To work in Computer Security for large central processing system with network to mutliple distributed computers, RJE stations, terminals. Primary concern is system and data security.

Require experience with at least two years at same installation working in systems programming under MVS. Experience in Computer Security desireable, but not required. Appropriate degree preferred.

Excellent opportunity and challenge for the qualified person who wishes to broaden their background and get on the ground floor of this new and growing field.

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A key subsidiary of Western Union Corporation, our success stems from maintaining state-of-the-art technology and applying it to leasing and servicing a full line of high and low speed teleprinter, video and intelligent terminals. This, coupled with our systems approach to service and our increasing dominance in the areas of electronic mail, communicated word processing and sophisticated word/data entry systems keeps us ahead of the competition in a very competitive industry. To stay ahead and accelerate our growth, we're seeking some growth-oriented individuals who may also be seeking that every-illusive "good life". We have it, if you have the professional skills we need:

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You'll have at least four years' experience backed by a BSEE or equal and the ability to design and spec multi-tasking, multi-programming operating systems. Areas of heavy concentration should include: Primitives, table layouts, queueing, calling sequences, I/O drivers and handlers and file access methods. In addition, you'll have a well-developed working knowledge of communication protocols, high level language intervals and organization techniques.

An MSEE in Computer Science, Engineering or Math will help greatly in carrying out your responsibilities which inlude the specification, design, writing, debugging and documentation of software for "intelligent" communications terminals, distributed data processing (DDP), word processing and electronic mail.

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The highly-skilled Systems Engineers needed to help us grow will have critical responsibilities in our aggressive sales/marketing program. Each should have Computer Sciences or equal. You should have communications computer systems and field sales experience with end users and know communications protocols, facilities, modems, systems design, computer operation, applications system design and programming. In addition, you'll be better able to carry out your substantial duties if you're familiar with micro-processing programming of user applications and have experience in IBM as well as other types of software.

You'll provide systems engineering support in the analysis, design and implementation of terminal communications systems and a technical support program. Responsibilities include: sales assistance, customer service, systems impimentation account responsibility, staff and field sales assistance (communications protocol and applications software), and sales support telephones.

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Field support position. Key requirements include telecommunications exp., operating systems understanding, customer orientation, & familiarity in TAL, SPL, ALGOL & assembler languages.

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Requires 2-5 yrs. exp. in the industry. BS/MSEE desirable. Ideal applicants would have developed products which are in volume production and experience in 7400 & 7400LS logic families. Familiarity with microprocessor & microprogramming a must; at least 1 high level computer language helpful.

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Must have working knowledge of TTL technology & be capable of detailing digital circuit analysis to breadboard new circuit designs. Must be familiar with minicomputer programming language & hardware architecture.

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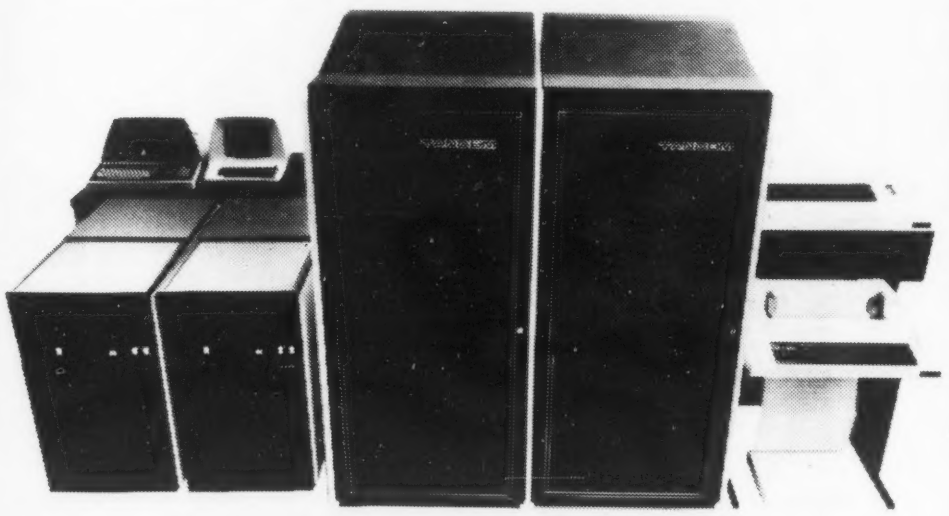

TANDEM COMPUTERS

For immediate consideration, send resume, including salary history, to TANDEM COMPUTERS, INC., ATT: Employment, 19333 Vallco Parkway, Cupertino, CA 95014, or call in California: **(408/996-6000)**; out of California, TOLL FREE: **(800/538-9360)**. Or contact local offices in Chicago, **(312/298-1355)**; in New York, **(212/594-2320)**; in Dallas/Ft. Worth, **(817/640-8771)**.

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Senior Software Engineers

To review and plan Retail Systems software strategy for Point-of-Sale terminals, communication processors, and general EDP systems. Will provide consultation to the Retail System family standards and hardware groups. Moreover, he/she will provide intra-and inter-divisional liaison to insure development of interfaces and problem solutions.

A broad understanding of operating systems methodology, application programming techniques, and technology directions will be required as well as sufficient familiarity with hardware design to allow effective assessment of hardware/software interfaces and interactions. A familiarity with high level languages and structural design techniques will be a strong asset.

An appropriate degree and from 2-7 years experience will provide the necessary skills.

Programmer Analyst

To develop and enhance operating systems software and support for Retail Operating Systems department. You will define projects under broad guidelines and objectives and specify programs for the system application; develop and participate in appropriate tests to assure systems reliability.

A degree and 2 years experience with micro/mini processor and real time programming as well as a good working knowledge of recent developments in hardware/software application will qualify you for consideration. This is a highly visible position.

Communications Systems Engineer

This senior position involves responsibility for generation of retail system communication standards and guidelines based upon Corporate Standards and industry practices. Will also serve as the division representative to the Corporate Distributed Network Architecture review board. Additional tasks will involve the design of retail communication systems architecture, development of strategy plans and serving as a consultant to other members of the division.

A degree (MS preferred) and 8-10 years experience including design level and system development management. Broad working knowledge of data communications products throughout the industry.

Computer Design Engineer

Excellent opportunity in our Advanced Development Group for candidate who will be conceptualizing the architectural and hardware design for Future Retail Terminal Systems and memories. Essential to this will be the evaluation and recommendation of levels of technology and then develop these concepts for microprocessors, memories, and other system components for use in future POS systems.

BS/MS Degree and from 6-8 years experience in logic design which should include a minimum of 3 years experience in microprocessor and solid state memory design.

Systems Integration Engineer

This is an excellent lead technical position for candidate with proven ability to take the system components (terminals, processors, modems, peripherals, etc.) and software packages and put them together into a working system, test the system to test plans, and insure that the system functions to overall specifications. In addition, you will characterize (measure) the system performance and document the operating characteristics. Will also provide support to field engineering and customer representatives in resolving system level problems.

A degree and five (5) or more years experience in real time computer systems and telecommunications is required. An ability to direct the technical efforts of associated team members is essential as is an ability to write effectively.

Please send resume or call collect

Robert W. Donovan, Personnel Resources
NCR Corporation
Engineering & Manufacturing—Cambridge
P.O. Box 728, Cambridge, Ohio 43725
614-439-0291

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Complete Computer Systems

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Knowledge of banking/financial systems, RPG, BAL desirable. B.S. degree required.

SYSTEMS ANALYST

Knowledge of banking/financial systems, programming. Good communications skills. Consulting experience preferred. B.S. degree required. Salaries are open.

Send resume in confidence to Dataman corporation, 1807 Capitol Avenue, Cheyenne, Wyoming 82001.

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Systems Programmers

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You will be responsible for the installation, daily operation, backup and recovery, debugging, maintenance and tuning of DBMS on the Corporate Computer Center systems utilizing MVS. You must have extensive knowledge of VS2 internals and concepts in a production environment. Additionally, you have experience with VS2, JCL, utilities, assembler language, and database concepts. Hopefully, you have teleprocessing experience. Please indicate 7531-E on your response.

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You will be responsible for supporting approximately 600 local Amdahl computer users in the effective utilization of computing facilities and services. This includes consultation and assistance in problem definition and solution, education and training in the use of TSO, SPF, JCL, utilities, JES2, CMS and Amdahl standards. You also will be responsible for the Users Guide and publishing bulletins. Experience in all the above areas and broad exposure to large systems is a must. Please indicate 7534-E on your response.

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PROGRAMMER/ANALYSTS

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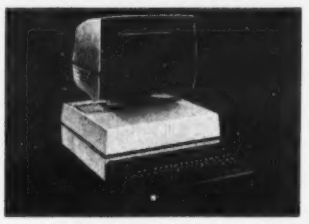

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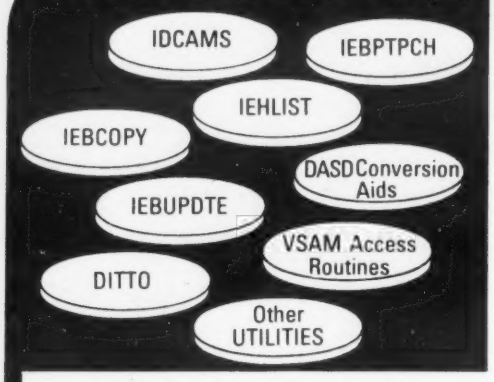

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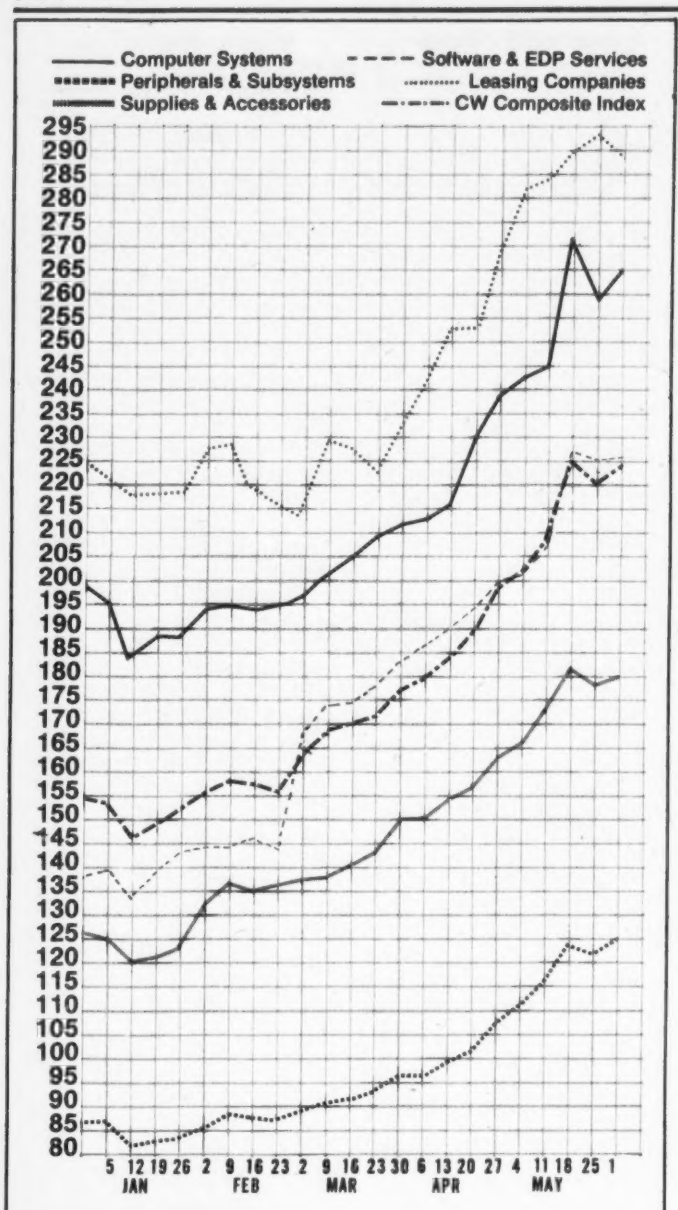

Earnings Reports

ANACOMP
Three Months Ended March 31

	1978	1977
aShr Ernd	$.35	$.29
Revenue	5,345,380	4,729,380
Earnings	418,883	350,511
a9 Mo Shr	.89	.78
Revenue	15,795,841	10,943,393
Earnings	1,069,265	872,596

a-Reflects a 10% stock dividend in September 1977 and April 1978.

CENTRONICS DATA COMPUTER
Three Months Ended March 31

	1978	1977
Shr Ernd	$.62	a$.53
Revenue	19,688,291	14,809,299
Earnings	3,600,785	3,249,569
9 Mo Shr	1.74	a1.51
Revenue	53,458,741	42,029,635
Earnings	10,125,711	9,171,529

a-Adjusted to reflect 25% stock dividend in October 1977.

CINCINNATI MILACRON
Three Months Ended March 25

	1978	1977
Shr Ernd	$.92	a$.58
Revenue	147,794,000	116,116,000
Earnings	6,786,000	4,122,000

a-Adjusted for two-for-one stock split in January 1978.

TESDATA SYSTEMS
Three Months Ended March 31

	1978	1977
Shr Ernd	$.33	$.38
Revenue	4,171,000	3,279,000
Earnings	417,000	393,000

WANG LABORATORIES
Three Months Ended March 31

	1978	1977
Shr Ernd	$.31	a$.17
Revenue	50,964,000	32,036,000
Earnings	3,518,000	1,803,000
9 Mo Shr	.79	a.47
Revenue	134,333,000	88,268,000
Earnings	8,765,000	4,875,000

a-Adjusted for a Class B stock dividend in July 1977.

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MAY 31, 1978

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1977-78 RANGE (1)	CLOSE MAY 31 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	22- 34	32 7/8	+ 3/8	+1.1
N	BURROUGHS CORP	55- 91	72	+ 1/8	+0.1
O	COMPUTER AUTOMATION	18- 36	33 3/4	-1 1/4	-3.5
N	CONTROL DATA CORP	20- 33	32 5/8	+1 1/8	+3.5
O	CRAY RESEARCH INC	15- 46	40 1/2	-2 1/4	-5.2
N	DATA GENERAL CORP	35- 59	55 3/8	0	0.0
N	DATAPOINT CORP	18- 56	55 7/8	+3 1/2	+6.6
N	DIGITAL EQUIPMENT	37- 53	47 5/8	- 1/8	-0.2
N	ELECTRONIC ASSOC.	2- 8	7 7/8	+ 5/8	+8.6
A	ELECTRONIC ENGINEER.	8- 17	15 1/2	- 1/2	-3.1
O	FOUR-PHASE SYSTEMS	13- 32	31 1/4	+ 1/2	+1.6
N	FOXBORO	28- 54	36 1/4	+1 3/8	+3.9
O	GENERAL AUTOMATION	6- 13	13 1/4	+2 1/4	+20.4
O	GRI COMPUTER CORP	1- 1	1 1/4	+ 1/8	+11.1
N	HEWLETT-PACKARD CO	62- 87	77 3/4	-1 1/2	-1.8
N	HONEYWELL INC	43- 58	57	+1 3/8	+2.4
N	IBM	236-286	258 1/4	-4 1/4	-1.6
O	MANAGEMENT ASSIST	5- 18	16 1/4	- 7/8	-5.1
O	MICRODATA CORP	7- 18	15 7/8	+ 3/8	+2.4
O	MINI-COMPUTER SYST	5- 12	7 1/4	0	0.0
O	MODULAR COMPUTER SYS	5- 15	14	+1 1/4	+9.8
N	NCR	32- 57	54 1/4	+ 5/8	+1.1
O	PRIME COMPUTER INC	12- 22	22 1/8	+1 5/8	+7.9
N	PERKIN-ELMER	17- 23	22 7/8	+1	+4.5
N	RAYTHEON CO	16- 47	45 3/4	+2	+4.5
N	SPERRY RAND	30- 44	41 3/4	- 1/4	-0.5
O	SYCOP INC	8- 24	24	0	0.0
A	SYSTEMS ENG. LABS	5- 19	17 3/4	+ 1/4	+1.4
A	WANG LABS.	10- 23	21	- 1/8	-0.5

LEASING COMPANIES

EXCH		1977-78 RANGE (1)	CLOSE MAY 31 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALANTHUS CORP	3- 6	5 7/8	0	0.0
C	BOOTHE COURIER CORP	8- 18	16 3/8	- 1/2	-2.9
O	COMDISCO INC	9- 17	15 3/4	+1	+6.7
A	COMMERCE GROUP CORP	1- 3	5/8	- 1/4	-28.5
A	COMPUTER INVSTRS GRP	1- 2	7/8	- 1/8	-12.5
N	DATRONIC RENTAL	0- 2	1 5/8	0	0.0
A	DCL INC	1- 4	4	+ 1/4	+6.6
N	DPF INC	6- 12	12	+ 7/8	+7.8
N	ITEL	13- 27	24 3/4	- 1/8	-0.5
N	LEASCO CORP	19- 34	32 1/2	+ 1/8	+0.3
O	LEASPAC CORP	1- 2	1 7/8	0	0.0
A	PIONEER TEX CORP	5- 11	6 7/8	+ 3/8	+5.7
N	U.S. LEASING	10- 16	14 7/8	- 1/8	-0.8

SOFTWARE & EDP SERVICES

EXCH		1977-78 RANGE (1)	CLOSE MAY 31 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	0- 2	1 1/4	- 1/8	-9.0
O	ANACOMP INC	7- 14	14 3/8	+ 7/8	+6.4
A	APPLIED DATA RES.	5- 14	12 5/8	- 1/8	-0.9
N	AUTOMATIC DATA PROC	23- 32	31 1/2	+ 3/4	+2.4
O	COLEMAN AMERICAN COS	1- 2	1 1/2	0	0.0
O	COMPU-SERV NETWORK	7- 15	10	- 1/2	-4.7
O	COMP ELECTION SYSTMS	6- 10	9	0	0.0
O	COMPUTER HORIZONS	1- 2	3 3/4	+ 3/4	+25.0
O	COMPUTER NETWORK	6- 11	10 1/4	+ 3/8	+3.7
N	COMPUTER SCIENCES	7- 12	11 5/8	+ 3/8	+3.3
O	COMPUTER TASK GROUP	1- 4	4 1/2	+1	+28.5
O	COMPUTER USAGE	1- 4	3 1/8	- 1/4	-7.4
O	COMSHARE	5- 15	13 1/4	- 3/4	-5.3
O	DATA DIMENSIONS INC	3- 5	4 7/8	+ 1/2	+11.4
O	DATATAB	1- 2	1	- 1/4	-20.0
N	ELECTRONIC DATA SYS.	14- 23	20 3/4	+ 3/8	+1.8
O	INSYTE CORP	2- 3	1 1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 2	2 1/4	0	0.0
O	KEANE ASSOCIATES	3- 4	3 3/4	0	0.0
O	KEYDATA CORP	1- 3	1 3/4	- 1/4	-12.5
A	LOGICON	7- 17	12 1/4	-1 1/8	-8.4
A	MANAGEMENT DATA	1- 2	1 1/4	0	0.0
A	NATIONAL CSS INC	10- 26	24 3/8	- 1/8	-0.5
O	NATIONAL DATA CORP	4- 12	11	+ 1/4	+2.3
A	ON LINE SYSTEMS INC	16- 25	23 7/8	+1	+4.3
N	PLANNING RESEARCH	3- 7	6 3/4	+ 3/8	+5.8
O	PROGRAMMING & SYS	1- 1	7/8	0	0.0
O	RAPIDATA INC	2- 5	5	0	0.0
O	REYNOLDS & REYNOLD	17- 26	24 1/4	-1	-3.9
O	SCIENTIFIC COMPUTERS	1- 6	5 1/4	- 1/8	-2.3
O	TYMSHARE INC	14- 27	24 3/4	+ 1/2	+2.0
A	URS SYSTEMS	4- 7	6 1/4	0	0.0
N	WYLY CORP	1- 5	4 7/8	- 1/8	-2.5

PERIPHERALS & SUBSYSTEMS

EXCH		1977-78 RANGE (1)	CLOSE MAY 31 1978	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	10- 24	23	+1 3/8	+6.3
O	ADVANCED MEMORY SYS	7- 14	13 5/8	+1	+7.9
N	AMPEX CORP	8- 17	17 1/8	+2 3/8	+16.1
O	ANDERSON JACOBSON	3- 8	7 1/2	0	0.0
N	APPLIED DIG DATA SYS	10- 20	16 1/2	- 1/8	-0.7
O	BEEHIVE INT'L	5- 12	5 7/8	+ 1/8	+2.1
A	BOLT,BERANEK & NEW	6- 10	8 1/2	+ 1/2	+6.2
N	BUNKER-RAMO	8- 17	17	0	0.0
A	CALCOMP	3- 9	8 5/8	+ 3/8	+4.5
O	CAMBRIDGE MEMORIES	1- 6	6 1/4	+ 3/4	+13.6
N	CENTRONICS DATA COMP	16- 30	26 1/4	+1 1/2	+6.0
C	COGNITRONICS	1- 3	2	+ 1/4	+14.2
O	COMPUTER COMMUN.	5- 10	8 1/2	- 3/8	-4.2
C	COMPUTER CONSOLES	4- 8	8	+ 3/4	+10.3
A	COMPUTER EQUIPMENT	2- 6	5 1/4	- 1/8	-2.3
C	COMPUTER TRANSCEIVER	1- 1	1 3/8	0	0.0
O	COMTEN	9- 24	22 3/4	- 1/2	-2.1
N	CONRAC CORP	19- 28	23 1/4	- 1/2	-2.1
O	DATA ACCESS SYSTEMS	4- 5	4 1/4	0	0.0
O	DATA 100	6- 17	16 1/8	0	0.0
A	DATA PRODUCTS CORP	9- 20	18 1/2	- 1/4	-1.3
O	DATA TECHNOLOGY	3- 4	4	- 1/4	-5.8
C	DATUM INC	1- 4	4 1/4	+ 1/8	+3.0
O	DECISION DATA COMPUT	2- 3	2 7/8	0	0.0
O	DELTA DATA SYSTEMS	1- 1	1/2	+ 1/8	+33.3
A	DOCUMATION INC	6- 21	20 3/8	+ 5/8	+3.1
O	DATARAM CORP	2- 24	21 1/4	- 3/4	-3.4
N	ELECTRONIC M & M	4- 7	6 7/8	+ 1/4	+3.7
O	FABRI-TEK	1- 2	1 3/8	+ 1/8	+10.0
O	GENERAL COMPUTER SYS	0- 2	1 3/8	0	0.0
N	HAZELTINE CORP	8- 15	14 1/2	+ 5/8	+4.5
N	HARRIS CORP	28- 58	53 3/4	+ 1/2	+0.9
O	INFOREX INC	4- 9	9 1/8	+ 1/4	+2.8
O	INFORMATION INTL INC	8- 14	9	- 1/2	-5.2
O	INTEL CORP	38- 59	55	+1 1/2	+2.8
A	LUNDY ELECTRONICS	3- 6	3	- 1/4	-7.6
O	MSI DATA CORP	6- 19	17 1/4	+ 1/4	+1.4
N	MEMOREX	23- 48	47 1/2	+1 1/4	+2.7
N	MOHAWK DATA SCI	5- 12	11 1/8	+ 1/4	+2.2
O	PENRIL CORP	2- 9	9 1/4	+ 5/8	+7.2
N	PERTEC CORP	7- 14	13	+ 1/2	+4.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
C	PRECISION INST.	2- 2	2	0	0.0
O	QUANTOR CORP	3- 5	3	- 1/8	-4.0
O	RECOGNITION EQUIP	6- 10	8 1/2	- 1/8	-1.4
O	SCAN DATA	1- 4	3 3/8	+ 7/8	+34.1
N	STORAGE TECHNOLOGY	10- 39	37 3/4	+ 1/4	+0.6
O	T BAR INC	7- 19	15	+1 3/4	+13.2
O	TALLY CORP.	4- 9	7 3/4	- 3/8	-4.6
A	TEC INC	6- 10	7 1/4	- 3/4	-9.3
N	TEKTRONIX INC	29- 44	40 3/4	- 3/4	-1.8
N	TELEX	2- 7	6 5/8	+ 3/4	+12.7
O	TESDATA SYSTEMS CP	13- 20	17 1/4	+ 1/4	+1.4
O	WILTEK INC	1- 1	5/8	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1977-78 RANGE (1)	CLOSE MAY 31 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 9	8 1/4	- 1/8	-1.4
O	BALTIMORE BUS FORMS	1- 4	3 3/4	+ 1/2	+15.3
A	BARRY WRIGHT	10- 28	27 1/2	+1 7/8	+7.3
O	CYBERMATICS INC	1- 1	1 1/8	0	0.0
G	DUPLEX PRODUCTS INC	14- 25	24 1/4	- 1/8	-0.5
N	ENNIS BUS. FORMS	6- 16	15	- 1/4	-1.6
N	3M COMPANY	43- 56	53 3/8	- 3/8	-0.6
O	MOORE CORP LTD	24- 37	32	- 1/4	-0.7
N	NASHUA CORP	16- 31	28 3/4	+ 7/8	+3.1
C	STANDARD REGISTER	18- 26	24 3/4	0	0.0
O	TAB PRODUCTS CO	8- 19	10 3/4	+ 1/4	+2.3
N	UARCO	18- 27	23 5/8	-1 1/4	-5.0
A	WABASH MAGNETICS	10- 15	13	- 1/2	-3.7
N	WALLACE BUS FORMS	17- 24	23 5/8	+ 1/2	+2.1

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
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